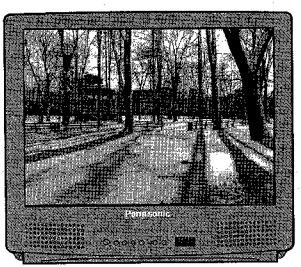
Service Manual

Color Television



Main Manual
(NA6D)

Panasonic

Models	Chassis
CT–36G22V	**APEDP288**
CT–36G22UV	**APEDP288**
CT–36G22CV	**APEDP288**
CT–36G32V	**AEDP288**
CT–36G32UV	**AEDP288**

This Service Manual is issued as a service guide for the models of the NA6D family listed above. Included in this manual are a set of schematics, operations overview, alignment procedures, disassembly procedures, and a complete parts list.

Note: Please refer to **NA6D/L Technical Guide** (MTC9702684G1) for functional descriptions and block diagrams.

The service technician is required to read and follow the "Safety Precautions" and "Important Safety Notice" in this manual.

Panasonic ®

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Important Safety Notice

Special components are used in this television set which are important for safety. These parts are identified on the schematic diagram by the symbol ⚠ and printed in **BOLD TYPE** on the replacement parts list. It is essential that these critical parts are replaced with the manufacturer's specified replacement parts to prevent X–ray radiation, shock, fire or other hazards. Do not modify the original design without the manufacturer's permission.

Safety Precautions

General Guidelines

An **Isolation Transformer** should always be used during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the Receiver from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always Replace Protective Devices, such as fishpaper, isolation resistors and capacitors, and shields after servicing the Receiver. Use only manufacturer's recommended rating for fuses, circuit breakers, etc.

High potentials are present when this Receiver is operating. Operation of the Receiver without the rear cover introduces danger from electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautions when servicing high–voltage equipment.

Extreme care should be practiced when **Handling the Picture Tube.** Rough handling may cause it to implode due to atmospheric pressure (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, use safety goggles and heavy gloves for protection. **Discharge the picture tube** by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging, connect cold ground (i.e. dag ground lead) to the anode with a well insulated wire or use a grounding probe.

Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to X–ray radiation.

The **Test Picture Tube** used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provides shielding for the tube viewing area against X–ray radiation as well as implosion. The magnetic shield limits X–ray radiation around the bell of the picture tube in addition to restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling 37.2kV without causing X–ray radiation.

Before returning a serviced receiver to the owner, the service technician must thoroughly test the unit to ensure that it is completely safe to operate. **Do not use a line isolation transformer when testing.**

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and exposed metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage Current Hot Check (See Figure 1)

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15μF capacitor between an exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other exposed metallic parts.

Verify that any potential does not exceed 0.75 volt RMS. A leakage current tester (such as a Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 1/2 milliamp. If any measurement is out of the specified limits, there is a possibility of a shock hazard and the Receiver must be repaired and rechecked before it is returned to the customer.

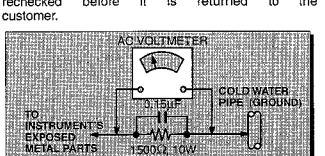

Figure 1. Hot Check Circuit

X–ray Radiation

WARNING: The potential source of X–ray radiation in TV sets is in the High Voltage section and the picture tube.

NOTE: It is important to use an accurate, calibrated high voltage meter.

Set the **brightness, picture, sharpness** and **color** controls to Minimum.

Measure the High Voltage. The high voltage meter should indicate 29.25kV for. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Horizontal Oscillator Disable Circuit Test

This test must be performed as a final check before the Receiver is returned to the customer. See **Horizontal Oscillator Disable Circuit Procedure Check** in this manual.

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Service Notes

NOTE: ***These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.***

Leadless Chip Components (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chip capacitor or resistor board solder pads may have holes through the board, however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitors may also be limited for the same reason. It is recommended that identical chip components be used.

Chip resistors have a three digit numerical resistance code – 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6KΩ resistor, 0 = 0Ω (jumper).

Chip capacitors generally do not have the value indicated on the capacitor. The color of the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicates the type and the second letter, the grade of transistor.

Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

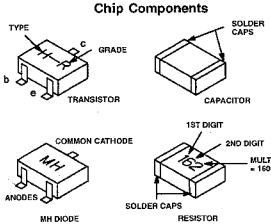
Component Removal

1. Use solder wick to remove solder from component end caps or terminals.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

Chip Component Installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.

Chip Components

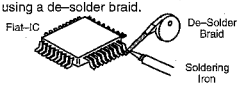


How to Replace Flat–IC

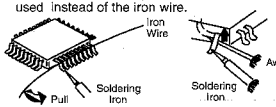
– Required Tools –

- Soldering iron
- De–solder braids
- Iron wire or small awl
- Magnifier

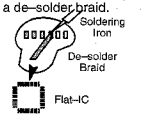
1. Remove the solder from all of the pins of a Flat–IC by using a de–solder braid.



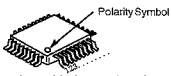
2. Put the iron wire under the pins of the Flat–IC and pull it in the direction indicated while heating the pins using a soldering iron. A small awl can be used instead of the iron wire.



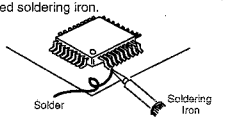
3. Remove the solder from all of the pads of the Flat–IC by using a de–solder braid.



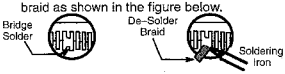
4. Position the new Flat–IC in place (apply the pins of the Flat–IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol.



5. Solder all pins to the soldering pads using a fine tipped soldering iron.



6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de–solder braid as shown in the figure below.



Service Notes (Continued)

IMPORTANT: To protect against possible damage to the solid state devices due to arcing or static discharge, make certain that all ground wires and CRT DAG wire are securely connected.

CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the Receiver to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground (⏚) or (⏚) when servicing, or incorrect voltages will be measured.

WARNING: This Receiver has been designed to meet or exceed applicable safety and X–ray radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X–ray radiation and shock and fire hazard, parts indicated with the symbol ⚠ on the schematic must be replaced with identical parts. Order parts from the manufacturer's parts center using the part numbers shown in this service manual, or provide the chassis number and the part reference number.

For optimum performance and reliability, all other parts should be replaced with components of identical specifications.

Horizontal Oscillator Disable Circuit

This chassis employs a special circuit to protect against excessive high voltage and beam current. If, for any reason, the high voltage and beam current exceed a predetermined level this protective circuit activates and detunes the horizontal oscillator that limits the high voltage.

The over–voltage protection circuit is not adjustable. However, if components indicated by the symbol ⚠ on the schematic in either the horizontal sweep system or the over–voltage protection circuit itself are changed, the operation of the circuit should be checked using the following procedure.

Equipment needed to check the disable circuit:

1. Voltmeter (0 – 200V scale)
2. High Voltage Meter (0 – 40kV)
3. Variac or Isolation Transformer

Procedure:

1. Tune in a station to verify that the horizontal is in sync.
2. Obtain a Monoscope pattern or a signal generator crosshatch pattern.
3. Connect the voltmeter (–) lead to TPD2 and the (+) lead to TPD1 (junction of D555 anode, R556 & R557). Set **Bright** level to (0) and **Picture** for a 1.8 volt reading on the voltmeter.
4. Turn the Receiver OFF. Connect a jumper across IC803 pin 3 and pin 4.
5. Reduce the AC supply voltage to approximately 45V. Connect the high voltage meter to the CRT anode (H.V. button). **NOTE:** Use the Dag Ground (C10 of the CRT Board) to connect the (–) lead of the meter.
6. Turn the Receiver ON. Slowly increase the AC supply voltage and verify that the high voltage does not exceed **37.2kV** when horizontal just begins to pull out of sync. If the high voltage is not within the specified limit, the cause must be determined and corrected before the Receiver is returned to the customer.

Feature Table

FEATURE \ MODEL	CT-36G22V	CT-36G22UV	CT-36G22CV	CT-36G32V	CT-36G32UV
Chassis	NA6D	NA6D	NA6D	NA6D	NA6D
# of channels / Phase	181 / PH22M	181 / PH22M	181 / PH22M	181 / PH22M	181 / PH22M
Menu language	ENG /SPAN/ FR	ENG /SPAN/ FR	ENG /SPAN/ FR	ENG / FR	ENG / FR
Closed Caption	X	X	X	X	X
# of tuners	1T	1T	1T	2T	2T
75 Ω input	X	X	X	X	X
Remote Model #	EUR511051A	EUR511051A	EUR511051A	EUR511050A	EUR511050A
Black face regular tube	X	X	X	X	X
Comb filter	GLASS	GLASS	GLASS	GLASS	GLASS
Notch filter	P	P	P	P	P
Video or Audio norm Switch (X=both)	X	X	X	X	X
MTS/SAP/DBX	X	X	X	X	X
Built-in audio power	3.5W X 2 (10%)	3.5W X 2 (10%)	3.5W X 2 (10%)	3.5W X 2 (10%)	3.5W X 2 (10%)
# of speakers	2	2	2	2	2
Bass/Bl/Tre Control	X	X	X	X	X
AI sound (simple)	X	X	X	X	X
Surround	–	–	–	X	X
A/V in (rear/front)	2/0	2/0	2/0	2/0	2/0
Fixed audio out	X	X	X	X	X
Variable audio out	X	X	X	X	X
S-VHS input (rear/front)	1/0	1/0	1/0	1/0	1/0
Dimensions mm (HxWxD) in	878 X 764 X 631 34.560 X 30.078 X 24.830	878 X 764 X 631 34.560 X 30.078 X 24.830	878 X 764 X 631 34.560 X 30.078 X 24.830	878 X 764 X 631 34.560 X 30.078 X 24.830	878 X 764 X 631 34.560 X 30.078 X 24.830
Weight (kb / lb)	68.49 / 151.00	68.49 / 151.00	68.49 / 151.00	68.49 / 151.00	68.49 / 151.00
Power source (V / Hz)	120 / 60	120 / 60	120 / 60	120 / 60	120 / 60
Power consumption, Max (A)	2.2	2.2	2.2	2.3	2.3
Anode voltage	31.5kV ± 1.25kV	31.5kV ± 1.25kV	31.5kV ± 1.25kV	31.5kV ± 1.25kV	31.5kV ± 1.25kV
Video input jack	$1V_{p-p}$ 75Ω phono jack	$1V_{p-p}$ 75Ω phono jack	$1V_{p-p}$ 75Ω phono jack	$1V_{p-p}$ 75Ω phono jack	$1V_{p-p}$ 75Ω phono jack
Audio input jack	500mV RMS, 47kΩ	500mV RMS, 47kΩ	500mV RMS, 47kΩ	500mV RMS, 47kΩ	500mV RMS, 47kΩ
To audio out jack	0~2.0V RMS, 4.7kΩ	0~2.0V RMS, 4.7kΩ	0~2.0V RMS, 4.7kΩ	0~2.0V RMS, 4.7kΩ	0~2.0V RMS, 4.7kΩ
"A" Board TNP2AH004	NIL	NIL	NIL	AB	AB
"C" Board TNP2AA006	AD	AD	AD	AD	AD
"CM" Board TNP2AA025	NIL	NIL	NIL	NIL	NIL
"S" Board TNPA0190	–	–	–	AC	AC
"X" Board TNP2AA007	AF	AF	AF	AE	AE
"Y" Board TNP2AA009	AB	AB	AB	AB	AB
"Z" Board TNP2AA010	AB	AB	AB	AB	AB

Table 1. **Receiver Features**

Specifications are subject to change without notice or obligation.
Dimensions and weights are approximate.

Location of Controls (Remote)

Basic Remote Control Functions

The following is an overview of the Remote Control unit for television operation. Ensure the TV mode is selected by initially pressing

Multi Button
Programmable to operate up to six Remote Control Function buttons simultaneously.

Power Button
Press to turn ON or OFF.

Mode Selection Buttons
Select the operation mode for the remote control.

Volume Buttons
Press to adjust TV sound level. Use with Channel buttons to navigate in menus.

Action Button
Press to display Main Menu and access or exit On Screen feature and Adjustment Menus.

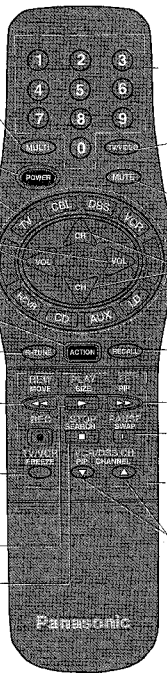
R–Tune (Rapid Tune) Button
Press to switch to the previous channel.

PIP Move Button
Press to position PIP frame to any corner of the Main Picture (when PIP frame is displayed).

PIP Freeze Button
Press to stop action in the Main Picture or PIP frame (when the PIP frame is displayed).

PIP Size Button
Press to select size of PIP frame (when the PIP frame is displayed).

PIP Search Button
This button is used to select PIP Search to automatically scan channels within the PIP Frame.



Home Theater Remote Control
EUR511050A & EUR511051A

Keypad "0 through 9" Buttons
Press desired channel number to randomly access any channel.

TV/Video Button
Press to select TV or one of two Video inputs, for the Main Picture or the PIP frame (when the PIP frame is displayed).

Mute Button
Press to mute sound. A second press resumes sound.

Channel Buttons
Press to select channels. Use with Volume buttons to navigate in menus.

Recall Button
Press to display Time, status of Sleep Timer, Channel, Video Mode, Channel Caption (Station Identifier) and Audio Mode.

PIP (Picture In Picture) Button
Press to display the PIP frame, press again to remove PIP frame.

PIP Swap Button
Press to interchange PIP frame with Main Picture (when the PIP frame is displayed).

VCR Function Buttons
Programmable to operate many brands of VCR's.

VCR/DSS (PIP) Channel Buttons
Select VCR or DSS Up/Down channels. Or, to select the channels within the PIP Frame UP or DOWN (when PIP frame is displayed.)

Helpful Hints:

If the selected component does not respond to the remote control, ensure that the proper mode is selected. **First**, press the **Mode Selection Button** that corresponds to that component. For example, after first pressing the TV Mode Button, the remote will remain in the TV mode for the following commands. If a different mode button is pressed while operating the television the TV mode button must be pressed again to enable the TV mode condition.

Note:
For more information on the Remote Control, please refer to the Remote Control Quick Reference Functional Key Chart.

Programming the Home Theater Remote

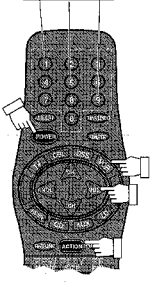
The remote control can be set to control other manufacturers components, by utilizing the **MODE SELECTION BUTTONS** for **CABLE, DSS, VCR, RCVR** (a **Receiver** or **Amplifier**), **CD, LD,** and **AUX** (for **Cassette Deck, Second VCR** or a **DVD.**)

Code Known

Use the following procedure for setting up the remote control using the numerical buttons when the component's remote code is known.

1. Determine the brand of the component.
2. Identify the code(s) associated with the brand from the infrared code index (see following pages). Record all possible codes.
3. Confirm that the component is plugged in and operating properly, then turn it OFF.
4. **Press and hold the ACTION button, then the POWER button so that both are pressed at the same time for at least 5 seconds.** Then let go of the buttons.
5. **Press the appropriate Mode button for the component.**
6. **Enter the 3-digit code, by using the Remote Control Keypad "0" through "9" buttons.**

   Now the remote is set for the entered code.
7. **Press the POWER button to test the remote. If the correct code is setup for the component (in step 6), the component will turn on.**



EUR511050

NOTE: Some brands have multiple codes. Repeat the procedure using another listed code until the component responds correctly.

Code Unknown

Use the following procedure for setting up the remote control when the component's remote access code is not known. This procedure uses the "sequence method".

1. Confirm that the component is plugged in and operating properly, then turn it OFF.
2. **Press and hold the ACTION button, then the POWER button so that both are pressed at the same time for at least 5 seconds.** Then let go of the buttons.
3. **Press the appropriate Mode button for the device.**
4. **Press the VOL button to step over to the next code.**
5. **Press the POWER button to test the remote. If the correct code is sent, the component will turn on.**
6. **Once the correct code is found, press the ACTION button to store the code.**
7. Repeat from step 4 above until the proper component code is found. It may take several attempts before the correct code is found.

NOTE: If an incorrect code is entered, or when the operation is not completed within 30 seconds, the settings will not change.

Infrared Remote Codes for Specific Components

Helpful Hint: Write down the code numbers for your components in the space provided below. This will serve as a handy reference whenever you need to reprogram your remote control.

CABLE Cable TV Converter Box	**VCR** Video Cassette Recorder	**CD** Compact Disc Player
DSS Digital Satellite System	**RCVR** Receiver or Amplifier	**LD** Laser Disc Player
Other Component	Other Component	Other Component
Other Component	Other Component	Other Component

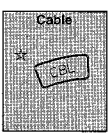
OPERATION

Cable Converter Box and CD Players Infrared Codes Index

The Universal Infrared Remote Control is capable of operating many brands of Cable Converter Boxes and CD Players. Refer to the Programming the Remote Control section for procedures.

Note: The Universal Remote Control memory is limited; therefore, some models of Cable Converter Boxes and CD Players may not operate. The Universal Remote Control is not designed to control all features that are available in all models.

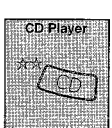
Note: After entering the proper infrared code, press the Remote **CBL** Selection Mode button (☆). Then refer to the Remote Control Key Functions section, for Remote CBL function key listing.



Codes for Cable Converter Box

Brand of Cable-TV Box	Code(s)	Brand of Cable-TV Box	Code(s)
ABC	530	Philips	006, 007, 540, 541, 542
Archer	531, 544	Pioneer	001, 260
Cableview	005, 544	Pulsar	005, 544
Citizen	005, 522	Puser	544
Curtis	130, 131	RCA	170, 220
Diamond	530, 531, 544	Realistic	544
Eagle	541	Regal	130, 350, 720, 730, 731, 900
Eastern	560	Regency	560
Gobrand	005, 544	Rembrandt	005, 544, 702
Gemini	522	Samsung	005
General Instrument	122, 360, 520, 521, 522, 530, 531, 532, 533	Scientific Atlanta	122, 130, 131
Hamlin	130, 350, 720, 730, 731, 900	Simark	001, 005
Hitachi	003, 530	Sprucer	005, 121
Jerrold	122, 360, 520, 521, 522, 530, 531, 532, 533	Stargate	005, 544
Macom	003, 004, 005	Teleview	001, 005
Memorex	542	Texscan	810
Movietime	005, 544	Tocom	700, 701
Oak	002, 702, 710	Toshiba	004
Panasonic	120, 121, 132	Unika	531, 544
Paragon	281	Universal	522, 544
		Vidoway	006
		Viewstar	541, 542
		Zenith	000, 280, 281
		Zenith/DrakeSatellite	000

Note: After entering the proper infrared code, press the Remote **CD** Selection Mode button (☆☆). Then refer to the Remote Control Key Functions section, for Remote CD Players function key listing.



Codes for CD Players

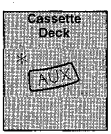
Brand of CD Players	Code(s)	Brand of CD Players	Code(s)
Admiral	110	Optimus	030, 057, 059, 061
Aiwa	162, 164	Panasonic	100, 101, 130
Carver	150, 151	Philips	150, 151
Denon	200	Pioneer	030
Emerson	172	Quasar	100, 101, 130
Fisher	005	RCA	160, 170, 171, 500
Garrard	057	Sansui	032, 050, 320
Harman/Kardon	059, 060	Sanyo	005
Hitachi	007	Scott	032, 050, 320
Jensen	163	Sharp	200, 201
JVC	190, 191, 270	Sherwood	059
Kardon	058	Sony	140
Kenwood	000, 001, 050, 270	Soundesigh	220
LXI	165	Teac	051, 055, 057
Magnavox	150, 161	Technics	100, 101, 130
Marantz	151	Victor	190, 191, 270
McIntosh	060	Yamaha	002, 003, 004
Nakamichi	032		
Onkyo	053, 054		

Cassette Deck, Receivers, and Amplifiers Infrared Codes Index

The Universal Infrared Remote Control is capable of operating many brands of Cassette Deck, Receivers, or Amplifiers. Refer to the Programming the Remote Control section for procedures.

Note: The Universal Remote Control memory is limited; therefore, some models of Cassette Deck, Receivers, and Amplifiers may not operate. The Universal Remote Control is not designed to control all features that are available in all models.

Note: After entering the proper infrared code, press the Remote **AUX** Selection Mode button (✳). Then refer to the Remote Control Key Functions section, for Remote Cassette Deck function key listing.



Code Index for Cassette Deck

Brand of Cassette Deck	Code(s)	Brand of Cassette Deck	Code(s)
Aiwa	760, 761, 762	Philips	751
Denon	800	Pioneer	630
Fisher	603	RCA	763, 770, 771
Jensen	657	Sansui	631, 653
JVC	780, 781	Sharp	800
Kenwood	600, 650	Sony	740
Marantz	751	Teac	653, 654
Nakamichi	631	Technics	700, 701, 730
Onkyo	651, 652, 656	Yamaha	601, 602
Panasonic	700, 701, 730		

Note: After entering the proper infrared code, press the Remote **RCVR** Selection Mode button (✳✳). Then refer to the Remote Control Key Functions section, for Remote Receivers/Amplifiers function key listing.

Code Index for Receivers and Amplifiers

Brand of Receiver / Amplifier	Code(s)	Brand of Receiver / Amplifier	Code(s)
Admiral	110	Panasonic	100, 101, 130
Aiwa	160, 161	Philips	150
Denon	200, 201, 202	Pioneer	030, 032
Fisher	004	Quasar	100, 101, 130
Garrard	055	RCA	003, 130, 162, 170, 171
Harman	150, 057	Sansui	003, 053, 320
Jensen	164	Sharp	200, 203
JVC	190, 191	Sony	140
Kenwood	000, 050	Soundesign	220
Magnavox	162	Teac	053, 054, 055
Marantz	151	Technics	100, 101, 130
McIntosh	056	Victor	190, 191
Nakamichi	031	Yamaha	001, 002
Onkyo	151, 156		
Optimus	003, 162, 170, 171		

OPERATION

Laser Disc, DSS (Digital Satellite System), and DVD (Digital Videodisc) Infrared Codes Index

The Universal Infrared Remote Control is capable of operating selected brands of Laser Disc, DSS Digital Satellite System, and DVD (Digital Videodisc). Refer to the Programming the Remote Control section for procedures.

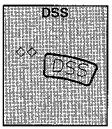
Note: The Universal Remote Control memory is limited; therefore, some models of Laser Disc, DSS Digital Satellite System, and DVD (Digital Videodisc) may not operate. The Universal Remote Control is not designed to control all features that are available in all models.

Note: After entering the proper infrared code, press the Remote **LD** Selection Mode button (◇). Then refer to the Remote Control Key Functions section, for Remote Laser Disc function key listing.

Codes for Laser Disc

Brand of Laser Disc	Code(s)	Brand of Laser Disc	Code(s)
Denon	370	Quasar	100, 101, 135, 380
Hitachi	000	RCA	370
Kenwood	002, 003	Samsung	160
Marantz	370	Sanyo	370
Mitsubishi	370	Sharp	200
NEC	370	Sony	140, 141, 142, 143
Panasonic	100, 101, 135, 380	Teac	370
Philips	150	Toshiba	370
Pioneer	370	Yamaha	001
Proscan	370		

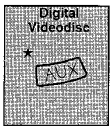
Note: After entering the proper infrared code, press the Remote **DSS** Selection Mode button (◇◇). Then refer to the Remote Control Key Functions section, for Remote DSS function key listing.



Codes for DSS (Digital Satellite System)

Brand of Satellite	Code(s)
GE	170
Panasonic	100
RCA	170
Sony	390

Note: After entering the proper infrared code, press the Remote **AUX** Selection Mode button (★). Then refer to the Remote Control Key Functions section, for Remote DVD function key listing.



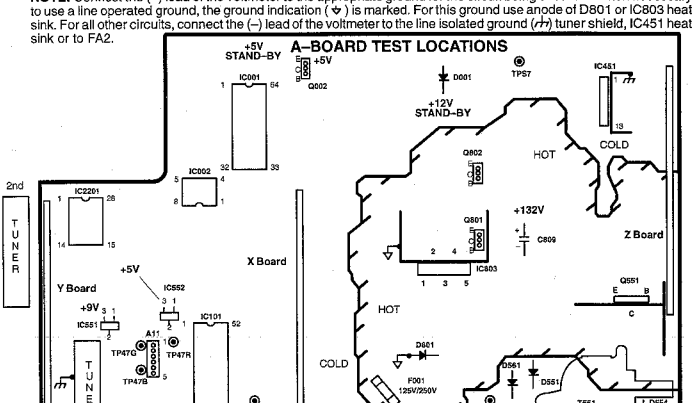
Codes for DVD (Digital Videodisc)

Brand of DVD	Code(s)
Panasonic	102

Chassis Service Adjustment Procedures

All service adjustments are factory preset and should not require adjustments unless controls and/or associated components are replaced.

NOTE: Connect the (–) lead of the voltmeter to the appropriate ground for the circuit being checked. When necessary to use a line operated ground, the ground indication (⏚) is marked. For this ground use anode of D801 or IC803 heat sink. For all other circuits, connect the (–) lead of the voltmeter to the line isolated ground (⏦) tuner shield, IC451 heat sink or to FA2.



MOMENTARILY CONNECT A JUMPER FOR ENTERING SERVICE MODE (FA1/TP8 to FA2/TP3)

131.0V B+ Voltage Confirmation

1. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu.
2. Connect a DVM between C809, + side and Hot ground (⏚).
3. Confirm that B+ voltage is 132.0V±2.5V. This voltage supplies B+ to the Horizontal Output & Flyback circuits.

Source Voltage Chart

120V AC line input. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu. Use cold ground (⏦) for the (–) lead of the DVM.

IC551 pin 3 ..... +9.0V ±0.5V
Cathode of D551 (TPD9) ..... +13.0V ±2V
C552 (+ side) ..... + 8.0V ±1V
Cathode of D561 (TPD8) ..... +27.4V ±2V
Cathode of D554 ..... +220V ±15V

Adjust Picture menu for normalized video adjustments.

B+ 5V Source Voltages

Volatile 5V:
C572, + side = IC552 pin 3, Tuner BP, IC101 (B+ V_{CC}).

MPU 5V:
Emitter Q002 = IC001(V_{DD}).

Standby 5V:
IC001 (Key in 1), I^2C EEPROM (IC002), TIMER LED, Remote Receiver.

B+ 9V Source Voltage

IC551 pin 3 = IC101 (B+ V_{CC}), Tuner (BM).

B+ 12V (Stand–by) Note: +16V when power is on

Cathode D001 = RL801 (on–off relay), Q002 (+5V Reg).

High Voltage Check

1. Select an active TV channel and confirm that horizontal is in sync.
2. Adjust Brightness and Picture using Picture Icon menu so video just disappears.
3. Confirm B+ 132V is within limit.
4. Using a high voltage meter confirm that the High Voltage is 31.5kV ±1.25kV

Disassembly for Service

Back Cover

Remove all the screws marked with an arrow (◀) from the back of the Receiver.

Note: screw configuration and number of screws may vary depending on the model of the Receiver serviced; various models are covered in this Manual.

1. 3 screws at the top edge of the Receiver.
2. 1 screw on the retainer plate for the AC power cord.
3. 1 screw by flyback assembly.
4. 2 screws by the A/V jacks.
5. 2 screws at the bottom edge of the Receiver.

A–Board – Main Chassis

1. Press tab on left rail.
2. Slide the chassis completely out of the guide rails. **NOTE:** Some tie–wraps that secure the wire dressings may need to be unfastened for chassis removal.
3. Stand the Receiver on its edge. The underside of the board is completely accessible for component replacement.

C–Board – CRT Output

Plugs into the socket on the CRT neck.

S–Board – Second Tuner

Located left to the Main Chassis – A–Board. Gently slide out of the cabinet.

X–Board – Comb Filter, A/V Jacks, Video Switching

Connected to the Main Chassis (A–Board). It is the board located close to the center of the A–Board. The X–Board is connected to the A–Board with 2 connectors. Pull on the X–Board, perpendicular to the A–Board, while releasing the snap tabs on connectors A1 & A2.

Y–Board – PIP Processing

Connected to the Main Chassis (A–Board). It is the board located close to the left edge of the A–Board. The Y–Board is connected to the A–Board with 2 connectors. Pull on the Y–Board, perpendicular to the A–Board, while releasing the snap tabs on connectors A31 & A32.

Keyboard Push Button Assembly

Fastened to the inside of the cabinet front by 3 screws.

Speakers

Secured to the cabinet by 2 screws each.

Disassembly for CRT Replacement

1. Discharge the CRT as instructed in the **Safety Precautions**.
2. Disconnect the yoke plug ,degaussing coil plug and the CRT 2nd anode button from the main board .
3. Remove the C–Board from the CRT base and unplug the black wire (CRT dag ground) C10–1 from the board.
4. Disconnect the A12 and SP plugs from the A–Board.
5. Slide the main chassis assembly completely out with the CRT Board attached.

CRT Replacement

1. Perform **Disassembly for CRT Replacement** procedure.
2. Insure that the CRT H.V. anode button is discharged before handling the CRT. See the **Safety Precautions** on handling the picture tube.
3. Remove the components from the CRT neck and place the cabinet face down on a soft pad.
4. Note the original order of the CRT mounting hardware as they are removed from the CRT mounting brackets at each corner of the CRT.
5. Remove the CRT with the degaussing coil and the dag ground braid attached.
6. Note the original locations and mounting of the degaussing coil and the dag ground assembly to insure proper reinstallation on the replacement CRT.

   To remove and re–mount the degaussing coil:
   The degaussing coil is held in place by clampers fastened to the CRT corner ears.
   These clampers must be installed onto the replacement CRT prior to mounting the degaussing coil.

   To remove and re–mount the dag ground braid:
   - Unhook the coil spring from the upper right CRT ear.
   - Release the braid loop from the upper left and the lower right CRT ear.
7. Mount the dag ground braid on the replacement CRT. Position the degaussing coil with new ties. Dress coil as was on the original CRT.
8. Replace the components on the CRT neck and re–install into cabinet. Verify that all ground wires and circuit board plugs get connected.

Geo–Magnetic Correction

The purpose of the Geo–Magnetic correction circuit is to compensate for the difference in the strength of the Earth's magnetic field in different locations.

Confirmation Procedure

1. Press the action key and select "setup" by the diamond keys. Press "Action".
2. Press the diamond key (lower) and select "geomagnetic–corr". Select "yes" by the volume control (+/–) and confirm that the on–screen horizontal bar appears.
3. Press the diamond key volume control and check the picture tilt clock wise (about 3 mm).
4. Press the diamond key volume control and check the picture tilt counter–clock wise (about 3 mm).
5. set the data to "8".

Purity and Convergence Procedure

Adjustment is necessary only if the CRT or the deflection yoke is replaced or if the setting was disturbed. The compiete procedure consists of:

1. Initial static convergence.
2. Setting the purity.
3. Final static convergence.

When the CRT or the Yoke is Replaced

Place the yoke on the CRT neck (do not tighten the clamp).

For a 2–piece assembly (see Figure 2)**:**

Position purity/convergence assembly as shown and tighten clamp snugly. Cut the hot–melt glue seal on assembly and place like tabs of purity device together at 12 o'clock to reduce its magnetic field effect. Manually degauss the CRT.

Turn the Receiver ON and slide the deflection yoke back and forth on the neck of the CRT. Stop at the position that produces a near white, uniform raster.

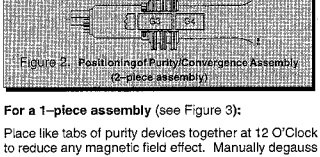


Figure 2. Positioning of Purity/Convergence Assembly (2–piece assembly)

For a 1–piece assembly (see Figure 3)**:**

Place like tabs of purity devices together at 12 O'Clock to reduce any magnetic field effect. Manually degauss the set.

Connect a Black/White pattern generator and tune the receiver to the signal. Slide the deflection yoke & purity ring assembly back and forth on the CRT neck. Stop at a position that produces a near white signal.

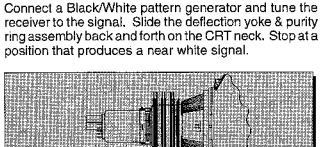


Figure 3. Positioning of Purity/Convergence Assembly (1–piece assembly)

Initial Center Static Convergence

Connect a dot/crosshatch generator to the Receiver and tune in signal. Observe misconvergence at center of the screen only.

Adjust the 4 pole magnet (center rings); separate tabs and rotate to converge blue with red.

Adjust the 6 pole magnet (rear rings): separate tabs and rotate to converge blue and red (magenta) with green. ***Note:*** *Precise convergence at this point is not important.*

Purity Adjustment

When the Receiver is in the Serviceman Mode for making electronic adjustments, press the **Recall** button on the Remote Control to enter Purity Check. (See **Service Adjustments Electronic Controls**.)

Operate the Receiver for 60 minutes using the first Purity check field (white screen) to stabilize the CRT.

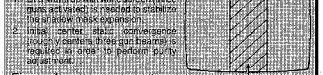
Fully degauss the Receiver by using an external degaussing coil.

Press the **Recall** button on the Remote Control again until the Purity Check (green screen) appears.

For a 2–piece assembly (see Figure 2)**:**

Loosen the deflection yoke clamp screw and move the deflection yoke back as close to the purity magnet as possible.

Adjust the purity rings to set the vertical green raster precisely at the center of the screen (see Figure 4).


NOTES:
1. CRT warm up with white screen (three guns activated) required to stabilize the shadow mask expansion.
2. Initial center static convergence must be complete (three gun beams is required to produce the perfect purity raster result).
Green Raster
Figure 4. Green Raster Adjustment

Slowly move the deflection yoke forward until the best overall green screen is displayed.

For a 1–piece assembly (see Figure 3)**:**

Slowly move the deflection yoke and purity rings assembly toward the CRT board and adjust the purity magnet rings to set vertical green raster at center of screen (see Figure 4).

Gradually move the deflection yoke & purity rings forward and adjust for the best overall green screen.

Continue from here for either assemblies:

Tighten the deflection yoke clamp screw.

Press the **Recall** button on the Remote Control again until the Purity Check (blue screen) and (red screen) appear and observe that good purity is obtained on each respective field.

Press the **Recall** button on the Remote Control again until Purity check (white screen) appears. Observe the screen for uniform white. If purity has not been achieved, repeat the above procedure.

Final Convergence Procedure (see Figure 5 through Figure 7)**:**

Note: *Vertical size and focus adjustments must be completed prior to performing the convergence adjustment. Connect a dot pattern generator to the Receiver. The* ***Brightness*** *level should not be higher than necessary to obtain a clear pattern.*

Converge the red and blue dots at the center of the screen by rotating the 4 pole (R with B) Static Convergence Magnets.

Align the converged red/blue dots with the green dots at the center of the screen by rotating the 6 pole (R/B with G) Static Convergence Magnets. Melt wax with soldering iron to reseal the magnets.

SERVICE

Slightly tilt vertically and horizontally (do not rotate) the deflection yoke to obtain a good overall convergence.

If convergence is not reached at the edges, insert permalloy (see following section) from the DY corners to achieve proper convergence. Recheck for purity and readjust if necessary.

After vertical adjustment of the yoke, insert wedge at 6 o'clock position, then make the horizontal tilt adjustment.

Secure the deflection yoke by inserting two side wedges at 2 and 10 o'clock positions.

Apply adhesive between tab (thin portion) of wedge and CRT and place tape over the tab to secure to the CRT.

Permalloy Convergence Corrector Strip (Part No. OFMK014ZZ)

This strip is used in some sets to match the yoke and CRT for optimum convergence. If the yoke or CRT is replaced, the strip may not be required.

First converge the set without the strip and observe the corners.

If correction is needed:

1. Place strip between CRT and yoke, in quadrant needing correction. Slowly move it around for desired results.
2. Press adhesive tightly to the CRT and secure with tape.

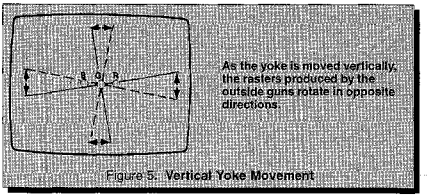


Figure 5. **Vertical Yoke Movement**

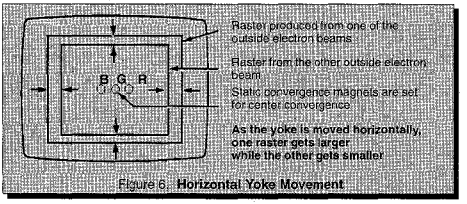

B G R
Raster produced from one of the outside electron beams
Raster from the other outside electron beam
Static convergence magnets are set for center convergence
As the yoke is moved horizontally, one raster gets larger while the other gets smaller

Figure 6. **Horizontal Yoke Movement**

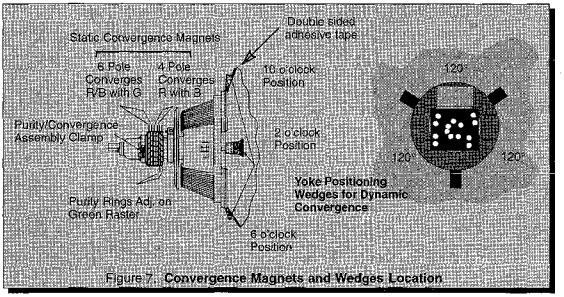


Figure 7. **Convergence Magnets and Wedges Location**

Instructional Flow Chart for Serviceman Mode

Caution: Always EXIT Serviceman Mode

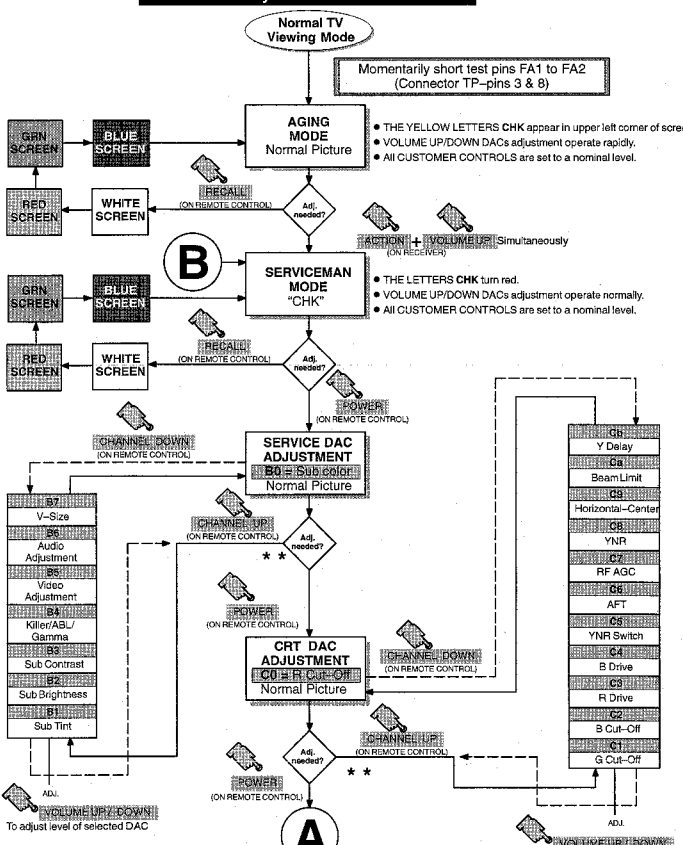


Figure 8. **Flow Chart for Serviceman Mode**

Instructional Flow Chart for Serviceman Mode – Continued

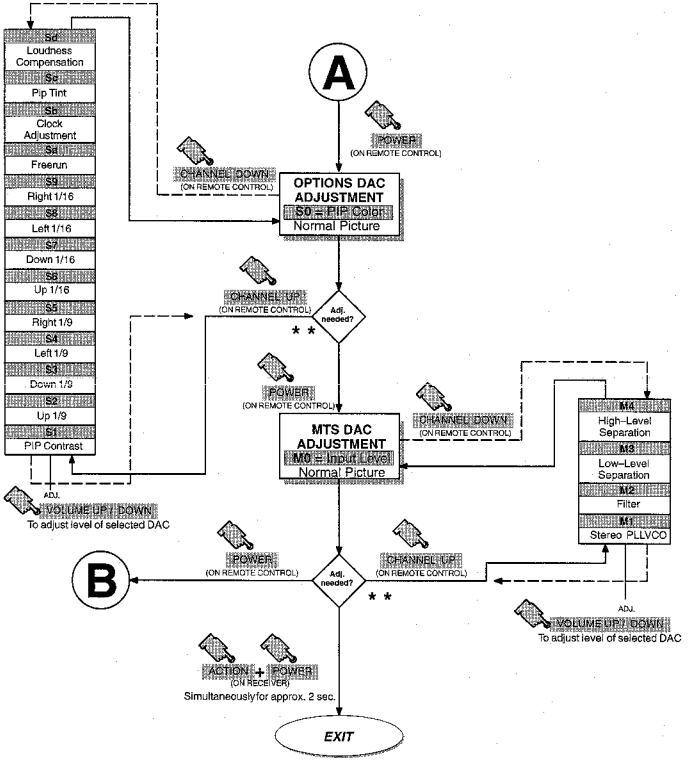


Figure 9. **Flow Chart for Serviceman Mode (Continued)**

Note: When *EXITING*, the Receiver shuts off, then turns on, TUNED TO CHANNEL 3 WITH A PRESET SOUND LEVEL.

Any Programmed Channels, Channels Caption data and some other user defined settings will be erased.

*** * *Important Note***

Before making any DAC adjustments note the existing values!

SERVICE

Serviceman Mode (Electronic Controls)

This Receiver has electronic technology using the I²C Bus Concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using the "On Screen Display Menu". (The **Serviceman Adjustment Mode**.)

Note: *It is suggested that the technician reads all the way through and understand the following procedure for Entering/Exiting the* ***Serviceman Adjustment Mode****; then proceed with the instructions working with the Receiver. When becoming familiar with the procedure, the Flow Chart for Serviceman Mode may be used as a quick guide.*

Quick Entry To Serviceman Mode:

At times when minor adjustments need to be done to the electronic controls, the method of Entering the Serviceman Mode without removal of the cabinet back is as follows using the Remote Control:

1. Select SET–UP icon and select CABLE mode.
2. Select TIMER Icon and set SLEEP timer for 30.
3. Press ACTION button twice to exit Menus.
   Tune to Channel 124.
   Adjust VOLUME to Minimum (0).
   On Receiver press the VOL ◄ button (decrease). Red "CHK" appears in upper corner.

To toggle between Aging and Serviceman modes:

While the "CHK" is displayed on the left top corner of the CRT, pressing the **Action** and the **Volume Down** buttons on the Receiver simultaneously will toggle between the modes.

4. **Press** the **Power** button on the Remote Control to select one of five Serviceman Adjustment Modes.
   1) B = Serviceman VCJ SUB ADJUSTMENTS
   2) C = Serviceman VCJ CUT–OFF ADJUSTMENTS
   3) S = Serviceman OPTIONS (PIP and CLOCK) ADJUSTMENTS
   4) M = Serviceman MTS ADJUSTMENTS
   5) "CHK" = Normal operation of CHANNEL ▲▼ and VOLUME ◄ ►

SERVICE

Note: *Only the applicable settings for the Receiver serviced will be available (see a in Figure 10).*

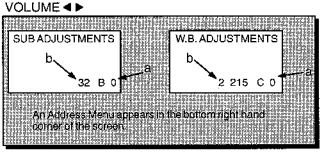


Figure 10. **Serviceman Mode Menu Adjustments**

For DAC Adjustments:

1. **Press**
   Channel Up/Down on the Remote Control to select one of the 8 available Service Adjustments (a in Figure 10).

   Important Note: *Write down the original value set (b in Figure 10) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press**
   Volume Up/Down on the Remote Control to adjust the level of the selected Service Adjustment (b in Figure 10).

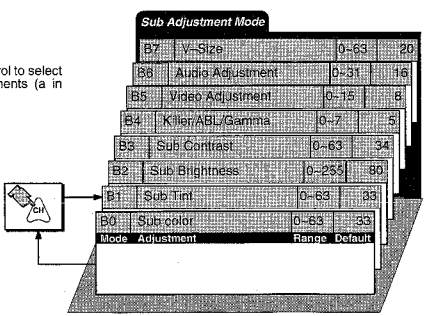

Sub Adjustment Mode
B7 V–Size 0–63 20
B6 Audio Adjustment 0–31 16
B5 Video Adjustment 0–15 8
B4 Killer/ABL/Gamma 0–7 5
B3 Sub Contrast 0–63 34
B2 Sub Brightness 0–255 80
B1 Sub Tint 0–63 33
B0 Sub color 0–63 33
CH
Mode Adjustment Range Default

Figure 11. **Sub Adjustment Mode**

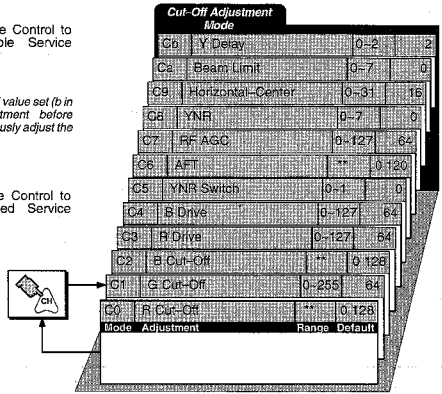
Press the **Power** button on the Remote Control to select the Serviceman White Balance Adjustment Mode.

For VCJ Cut–Off Adjustments:

1. **Press**
   Channel Up/Down on the Remote Control to select one of the 12 available Service Adjustments (a in Figure 10).

   Important Note: *Write down the original value set (b in Figure 10) for each address adjustment before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press**
   Volume Up/Down on the Remote Control to adjust the level of the selected Service Adjustment (b in Figure 10).


Cut-Off Adjustment Mode
C6 Y Delay 0-2 2
C5 Beam Limit 0-7 0
C9 Horizontal-Center 0-31 16
C8 YNR 0-7 0
C7 RF AGC 0-127 64
C6 AFT ** 0-120
C5 YNR Switch 0-1 0
C4 B Drive 0-127 64
C3 R Drive 0-127 64
C2 B Cut-Off ** 0-128
C1 G Cut-Off 0-255 64
C0 R Cut-Off ** 0-128
Mode Adjustment Range Default
CH

** ***Note:*** *Range is in steps:*
0 0 – 0 255
1 0 – 1 255

Figure 12. **White Balance Adjustment Mode**

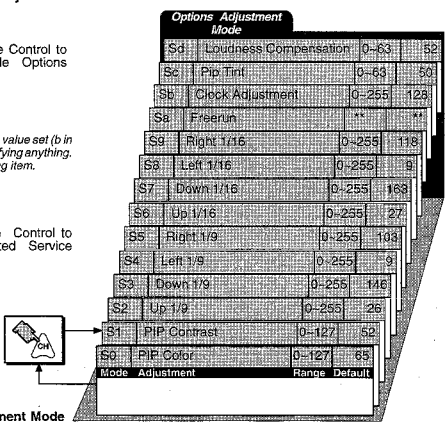
Press the **Power** button on the Remote Control to select the Serviceman MTS Adjustment Mode.

For Options (PIP and CLOCK) Adjustments:

1. **Press**
   Channel Up/Down on the Remote Control to select one of the 12 available Options Adjustments (a in Figure 10).

   Important Note: *Write down the original value set (b in Figure 10) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press**
   Volume Up/Down on the Remote Control to adjust the level of the selected Service Adjustment (b in Figure 10).


Options Adjustment Mode
Sd Loudness Compensation 0-63 32
Sc Pip Tint 0-63 50
Sb Clock Adjustment 0-255 129
Sa Freerun ** **
S9 Right 1/16 0-255 118
S8 Left 1/16 0-255 9
S7 Down 1/16 0-255 168
S6 Up 1/16 0-255 27
S5 Right 1/9 0-255 103
S4 Left 1/9 0-255 9
S3 Down 1/9 0-255 146
S2 Up 1/9 0-255 26
S1 PIP Contrast 0-127 52
S0 PIP Color 0-127 85
Mode Adjustment Range Default
CH

** *Set Freerun on during this item selected.*

Figure 13. **Options Adjustment Mode**

SERVICE

Press the **Power** button on the Remote Control to select the Serviceman MTS Adjustment Mode.

For MTS Adjustments:

1. **Press**
   Channel Up/Down on the Remote Control to select one of the 5 available MTS Adjustments (a in Figure 10).

   Important Note: *Write down the original value set (b in Figure 10) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press**
   Volume Up/Down on the Remote Control to adjust the level of the selected Service Adjustment (b in Figure 10).

3. Press the **POWER** button on the remote control to loop back to setting of the SUB ADJ Mode.

   OR

   Press **ACTION** and **POWER** buttons on the Receiver simultaneously for at least 2 seconds to return the Receiver to normal mode (exit Serviceman Mode).

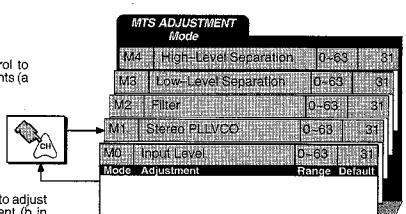

MTS ADJUSTMENT Mode
M4 High-Level Separation 0-63 31
M3 Low-Level Separation 0-63 31
M2 Filter 0-63 31
M1 Stereo PLL VCO 0-63 31
M0 Input Level 0-63 31
Mode Adjustment Range Default
CH

Figure 14. **MTS Adjustment Mode**

To Check Purity:

Press the **Recall** button on the Remote Control when in Serviceman Modes (red "CHK" is displayed) to enter the Purity Field Check Mode.

Note: *The Receiver must be in the Serviceman Mode to display color.*

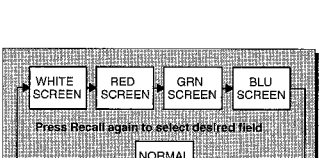


Figure 15. **Purity Check Field Mode**

SERVICE

IMPORTANT NOTE:
Always Exit the Serviceman Mode following Adjustments.

Exiting the Serviceman Mode:

Press the **Action** and the **Power** buttons on the Receiver simultaneously for at least 2 seconds.
"The Receiver exits Serviceman Mode".
The Receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound.

Helpful Hints

Entering Serviceman Mode (Other Method – back open):

1. While the Receiver is ON and operating in Normal Mode, momentarily short test point FA1 to cold ground (⏚) FA2 (A–Board: TP pin 8 to pin 3).
   "The Receiver enters the Aging Mode".
   Yellow letters "CHK" appear in the upper left corner of the CRT.
   (The Volume Up/Down will adjust rapidly.)
2. Simultaneously **press** the **Action** and the **Volume Up** buttons on the Receiver Control Panel.
   "The Receiver enters the Serviceman's Mode".
   The letters in "CHK" turn red.
   (The Volume Up/Down will adjust normally.)
   (All customer controls are set to a nominal level.)

Service Adjustments (Electronic Controls)

Video Adjustment Level

Serviceman DAC Adjustment (B5)

Preparation:

1. Obtain an NTSC color bar pattern with 100 IRE white and 87.5% modulation.
2. Connect the oscilloscope to TP12. Use cold ground for scope connection. Set the scope at Horizontal Sweep rate (20µs) time base.

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select DAC Video Adjustment Level (B5) and adjust for 1.0V ±0.05V from sync tip to white level. See Figure 16.

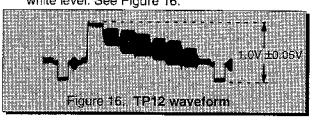


Figure 16. TP12 waveform

2. Set the DAC Sub–Contrast Adjustment (B3).

Sub–Contrast

Serviceman DAC Adjustment (B3)

This adjustment is factory set. **Do not adjust** unless repairs are made to associated circuits, the CRT Board, or when the CRT is replaced.

Preparation:

1. Apply a color bar signal pattern with 87.5% modulation, 70% saturated color bar with a 100 IRE white and 7.5 black.

NOTE: The pattern used in this procedure is an EIA color bar pattern with 87.5% modulation with 100 IRE white and 7.5 black. Correlate the information in this procedure to the pattern used if another signal is used.

2. Preset the following controls:
   - Brightness ..... Center
   - Color ..... Min
   - Picture ..... Max.
   - Sharpness ..... Center
3. Connect the oscilloscope to the CRT–Board connector C1–2. Set the scope time base to 20µs (horizontal).
4. Connect a jumper from TPD2 to ground (⏚).
5. Connect a jumper from IC101 pin 28 to ground (⏚).

Procedure:

1. In the Serviceman Mode for electronic adjustments, select DAC Sub–Brightness Adjustment (B2) and adjust for 1.0–1.5Vp–p between blanking and 7.5 IRE level so that the black level cannot be compressed. (see video waveforms detail, Figure 17).
2. In the Serviceman Mode for electronic adjustments, select DAC Sub–Contrast Adjustment (B3) and adjust for 2.8Vp–p ±0.1V from white level to black level on video waveform (see video waveforms detail, Figure 17).

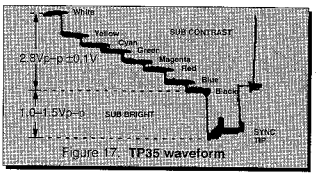


Figure 17. TP35 waveform

3. Remove the jumpers (Preparation steps 4 and 5).

Tint/Color Adjustment

Serviceman DAC Adjustment (B1) (B0)

Preparation:

1. Apply a rainbow color bar signal.
2. Preset the following controls:
   - Brightness ..... Min.
   - Color ..... Center
   - Picture ..... Max.
   - Sharpness ..... Min
   - Tint ..... Center
3. Connect the oscilloscope to TP47B (A–Board) or to connector C1 pin 3.
4. Connect a jumper from TPD2 to GND (⏚).
5. Connect a jumper from IC101 pin 28 to ground (⏚).

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select DAC Sub–Tint Adjustment (B1). Adjust until the waveform measured is as the one shown in Figure 18.

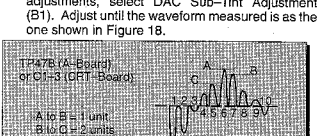


Figure 18. TP47B waveform

2. Connect the oscilloscope to TP47G (A–Board) or to connector C1 pin 2 (CRT–Board).
3. Select DAC Sub–Color Adjustment (B0) and adjust for peak to peak amplitude to be 0.9V p–p ±0.05V (Figure 19).

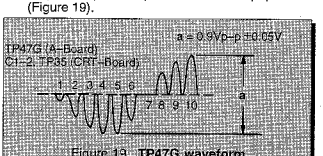


Figure 19. TP47G waveform

4. Remove the jumpers (Preparation steps 4 and 5).

SERVICE

Service Adjustments (Electronic Controls,cont.)

Color Temperature Adjustment (B/W Tracking)

Serviceman DAC Adjust. (C0) (C1) (C2) (C3) (C4)

Minor Touch–Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for "good grey scale and warm highlights".

1. LOW LIGHT areas – In Serviceman Mode for making electronic adjustments, select Cutoff (C0) RED, (C1) GRN, (C2) BLU and adjust the picture for grey.
2. HIGH LIGHT areas – In Serviceman Mode for making electronic adjustments, select Drive (C3) RED, (C4) BLU and adjust the picture for warm whites.

Complete Adjustment

Preparation:

1. Turn the Receiver "ON" and allow 10 minutes warm up at high brightness.
2. Apply a color bar signal with color "OFF".
3. Turn the SCREEN control (part of FBT T551) fully counterclockwise.

Procedure:

Preset the following Serviceman DAC's for the best results.

- C0 ..... 0 128
- C1 64
- C2 ..... 0 128
- C3 64
- C4 64

1. Connect the oscilloscope to C1–2 (CRT–Board).
2. In Serviceman Mode for making electronic adjustment, select the Sub–Bright DAC (B2).
3. Press the R–Tune key on the remote.
4. Observe the oscilloscope waveform at Horizontal rate and adjust the Serviceman Mode Sub–Bright DAC (B2) level until a scanning period of 3.0V above DC ground is measured, as indicated in Figure 20.

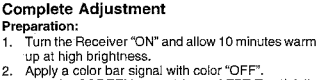


Figure 20. TP35 waveform

5. Connect the scope to GRN Cathode (KG) on the CRT–Board.
6. In the Serviceman Mode for making electronic adjustments, select the GREEN CUTOFF DAC (C1).
7. Press the R–Tune key on the remote.
8. View scope trace at Horizontal rate and adjust the Serviceman Mode DAC (C1) level until a scanning period of 195V above DC ground is measured, as indicated in Figure 21.

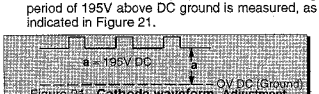


Figure 21. **Cathode waveform. Adjustment Waveform Detail (Steps 8, 12 & 16)**

9. Connect the scope to the RED Cathode (KR).
10. In Serviceman Mode for making electronic adjustments, select the RED CUTOFF DAC (C0).
11. Press the R–Tune key on the remote.
12. View the scope trace and adjust the Serviceman Mode DAC (C0) for the scanning period to be 195V above DC ground. (See Figure 21)
13. Connect the scope to the BLU Cathode (KB).
14. In Serviceman Mode for making electronic adjustments, select the BLU CUTOFF (C2).
15. Press the R–Tune key on the remote.
16. View the scope trace and adjust the Serviceman Mode DAC (C2) for the scanning period to be 195V above DC ground. (See Figure 21)
17. Turn the Screen Control (part of FBT) slowly clockwise until a color horizontal line appears.
18. With the other two colors Serviceman Mode DAC CUTOFF adjustments (C0) RED, (C1) GRN, (C2) BLU; increase the colors to create a white horizontal line.
19. Confirm that a good gray scale is established by viewing B/W color bar pattern.
20. In the Serviceman Mode for making electronic adjustments select the DAC DRIVE adjustments (C3) RED, (C4) BLU and adjust for warm white in a white color bar pattern.
25. EXIT the Serviceman Mode.
26. Adjust the Picture Menu Video Adjustments **Bright** and **Picture** from low scale to high scale and check Black and White tracking.
27. If correction is needed: Re–Enter the Serviceman Mode and perform the **Minor Touch – Up Method.**
28. Perform **Sub–Brightness** Adjustment procedure.

Sub–Brightness

Serviceman DAC Adjustment (B2)

Adjustment of this control is important for setting proper operation of customer brightness and picture controls. This adjustment must be made after Sub–Contrast or Color Temperature adjustments are made. **Do not adjust** SCREEN after the Sub–Brightness is set.

Preparation:

1. Apply a color bar signal with 100 IRE white and 7.5 IRE black. (Switch Color to "OFF" on the signal generator.) Operate the Receiver for a minimum of 10 minutes prior to performing this adjustment.
2. Preset the following controls:
   - Color ..... Center
   - Picture ..... Max.
   - Tint ..... Center

Procedure:

In the Serviceman Mode for making electronic adjustments, select the DAC adjustment (B2) and adjust until the black bar starts to look grey. Then decrease the level to the point where grey turns to black.

SERVICE

Service Adjustments (Electronic Controls,cont.)

Horizontal Centering

Serviceman DAC Adjustment (C9)

Preparation:

Connect a crosshatch generator.

Procedure:

1. In the Serviceman Mode for making electronic adjustments. Select the Horizontal Centering Adjustment DAC (C9) and adjust until the center of the crosshatch pattern is centered on CRT.
2. EXIT the Serviceman Adjustment Mode.

Audio Adjustment

Serviceman DAC Adjustment (B6)

This adjustment is factory set and needs to be performed only when IC002 or IC101 is replaced.

Preparation:

1. Apply the following signal at the antenna (70dB ±5dB, 75Ω open P/S 10dB): audio signal set to monaural, 300Hz, 100% modulation; video input of 100 IRE flat field, 30% modulation.
2. Connect the RMS Meter with filter jig as shown in Figure 22.

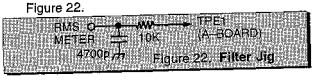


Figure 22. Filter Jig

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select the Audio Adjustment DAC (B6) and adjust until the RMS meter reading are:
   150mV RMS ±7.5mV RMS (Stereo models)
   250mV RMS ±12.5mV RMS (Mono models)
2. EXIT the Serviceman Adjustment Mode.

Clock Adjustment (Sb)

Preparation:

Connect the frequency counter from TPS1 (IC001 Pin 13) to cold ground (⏚).

NOTE: Frequency Counter probe capacitance should be 8pF or less.

Procedure:

1. Turn the Receiver "OFF" with the AC power applied.
2. Measure TPS1 (IC001 pin 13) for the frequency of the waveform and record the reading.

   Note: Pin 13 measurement must have at least four digits of resolution following the decimal point Example: 000.0000
3. Turn the Receiver "ON".
4. Place the Receiver into Serviceman Mode for making electronic adjustment, select the Clock Adjustment DAC (Sb).
5. Calculate and set Sb based on the following formula:

$$Sb = 128 + 0.901 \times 10^6 \times \frac{(244.1406 - \text{pin 13 [HZ]})}{244.1406}$$

NOTE: Pin 13 measurement will not change regardless of the value stored in Sb.

Vertical Size (B7)

1. Adjust the VERTICAL SIZE DAC control, B7, until the top and the bottom edges of the raster are visible.
2. Adjust the VERTICAL SIZE control B7, until the top and the bottom of the raster touch the bezel edge. Then advance SIZE control to obtain an approximately 10% overscan. Linearity adjustment is done automatically when the size is being adjusted. (Best results can be obtained with a round test pattern.)

SERVICE

Service Adjustments (Mechanical Controls)

VCO Field Alignment L105

1. Connect a balance antenna and select a midband channel (Ch 10, 11 or 12)
2. Attenuate the signal strength for a weak noisy video.
3. While observing the picture tube, adjust L105 until best picture appears.
4. Change channels and observe that they are tuning properly.
5. If the channel monitored is not clear, repeat steps 1, 3 and 4 while applying a stronger signal.

Focus (Part of T551)

Preparation:

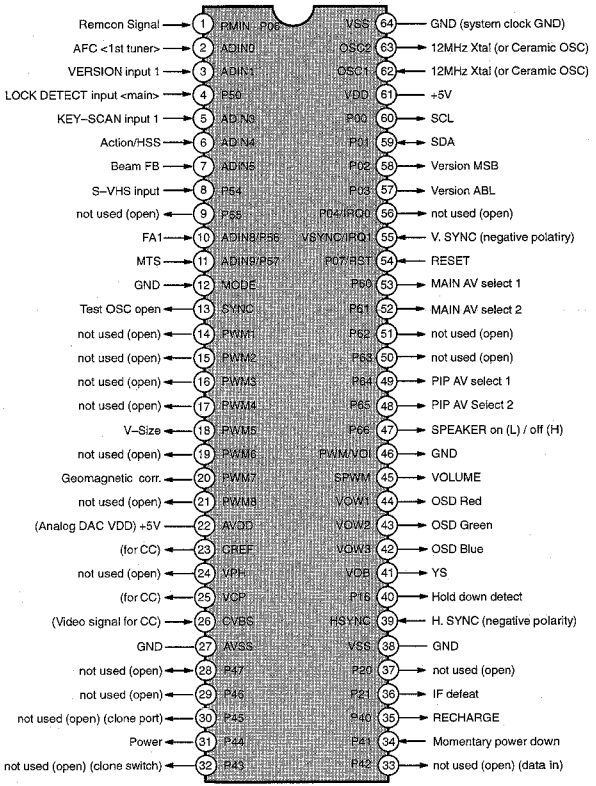
Connect a Signal generator and select a dot pattern.

Procedure:

Adjust the FOCUS control to obtain the sharpest and clearest dot pattern.

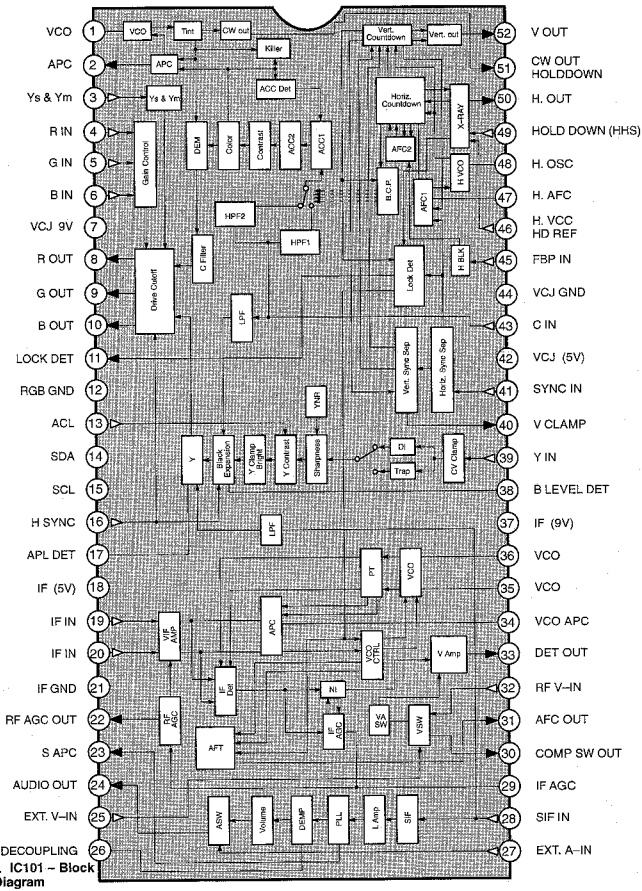
a. adjust for best center.
b. adjust for best area between the center and top right corner.

IC001 MPU IN/OUT Pins and Functions
MN1873265T7E & G



IC101 Block Diagram

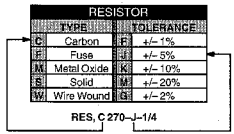
INPUT PINS = ◁ ▷ OUTPUT PINS = ◀ ▶

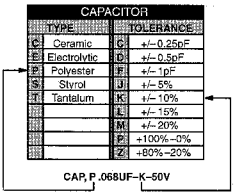


gure 23. **IC101 – Block Diagram**

Parts List Abbreviation Guide

DESCRIPTION OF ABBREVIATIONS GUIDE





REPLACEMENT PARTS LIST

(Models: CT–36G22V, CT–36G22CV, CT–36G22UV, CT–36G32V & CT–36G32UV)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
		CAPRISTORS
CRA801	**EXNG471P365**	**RES–CAP 470PF/3.6 MEG**
CRA802	**EXNG471P365**	**RES–CAP 470PF/3.6 MEG**
		CAPACITORS
C001	ECA1AM101	CAP,E 100UF/10V
C003	ECA1HM4R7	CAP,E 4.7UF/50V
C008	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C010	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C011	ECA1CM221	CAP,E 220UF/16V
C013	ECA0JM101	CAP,E 100UF/6.3V
C016	ECUX1H101JCX	CAP,C 100PF–J–50V
C017	ECUX1H220JCX	CAP,C 22PF–J–50V
C018	ECUX1H220JCX	CAP,C 22PF–J–50V
C019	ECA0JM101	CAP,E 100UF/6.3V
C020	ECA0JM101	CAP,E 100UF/6.3V
C021	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C022	ECA1CM471	CAP,E 470UF/16V
C024	ECA1EM4R7	CAP,E 4.7UF/25V
C025	ECUX1H101JCX	CAP,C 100PF–J–50V
C026	ECA1HM010	CAP,E 1.0UF/50V
C031	ECUX1H821KBX	CAP,C 820PF–K–50V
C032	ECA1CM470	CAP,E 47UF/16V
C036	ECUX1H220JCX	CAP,C 22PF–J–50V
C037	ECUX1H220JCX	CAP,C 22PF–J–50V
C038	ECUX1H220JCX	CAP,C 22PF–J–50V
C101	ECUX1H223ZFX	CAP,C .022UF–Z–50V
C102	ECA1EM100	CAP,E 10UF/25V
C103	ECUX1H300JCX	CAP,C 30PF–J–50V
C105	ECUX1H221JCX	CAP,C 220PF–J–50V
C106	ECA1HMR47	CAP,E .47UF/50V
C107	ECUX1H470JCX	CAP,C 47PF–J–50V
C108	ECA1HMR22	CAP,E .22UF/50V
C109	ECEA1EN4R7U	CAP,E 4.7UF–25V
C110	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C111	ECA1EM100	CAP,E 10UF/25V
C113	ECA1EM100	CAP,E 10UF/25V
C114	ECUX1H040CCX	CAP,C 4PF–C–50V
C151	ECA1HMR22	CAP,E .22UF/50V
C201	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C202	ECUX1H101JCX	CAP,C 100PF–J–50V
C203	ECA1EM4R7	CAP,E 4.7UF/25V
C301	ECUX1H390JCX	CAP,C 39PF–J–50V
C302	ECEA1HN010U	CAP,E 1UF/50V
C304	ECEA1HNR47U	CAP,E .47UF–50V
C305	ECA1HM4R7	CAP,E 4.7UF/50V
C306	ECA1CM221	CAP,E 220UF/16V
C308	ECQB1H823KF	CAP,P .082UF–K–50V
C309	ECA1AM101	CAP,E 100UF/10V
C310	ECA1EM4R7	CAP,E 4.7UF/25V
C311	ECA1EM4R7	CAP,E 4.7UF/25V
C312	ECA1EM330	CAP,E 33UF/25V
C315	ECUX1H560JCX	CAP,C 56PF–J–50V
C351	TACCW331T50V	CAP,C 330PF/50V
C352	TACCW331T50V	CAP,C 330PF/50V
C353	TACCW331T50V	CAP,C 330PF/50V
C354	ECKD3D102KB	CAP,C .001UF–K–2KV
C357	ECEA1HN010U	CAP,E 1UF/50V
C401	ECQB1H153KF	CAP,P .015UF–K–50V
C402	ECUX1H471JCX	CAP,C 470PF–J–50V
C403	ECA1HM2R2	CAP,E 2.2UF/50V
C451	ECEA1CGE470	CAP,E 47UF/16V
C452	ECSF1EE105	CAP,T 1.0UF/25V
C453	ECEA1HFS2R2	CAP,E 2.2UF/50V
C454	ECEA1EGE102	CAP,E 1000UF/25V
C455	ECA1VHG221B	CAP,E 220UF–35V
C456	ECQB1H103JF	CAP,P .01UF–J–50V
C459	ECEA1VGE471	CAP,E 470UF/35V
C460	ECQM1104JZ	CAP,P .1UF–J–100V
C462	ECA1HM100	CAP,E 10UF/50V
C501	ECUX1H821KBX	CAP,C 820PF–K–50V
C502	ECQB1H223JF	CAP,P .022UF–J–50V
C503	ECA1HM2R2	CAP,E 2.2UF/50V
C504	ECUX1H221JCX	CAP,C 220PF–J–50V
C505	ECUX1H221JUX	CAP,C 220PF–J–50V
C506	ECA1CM221	CAP,E 220UF/16V
C510	ECCD2H100D	CAP,C 10PF–D–50V
C511	ECKD2H821KB	CAP,C 820PF–K–500V
C512	ECKD2H101KB	CAP,C 100PF–K–500V
C531	**ECA1EM220**	**CAP,E 22UF/25V**
C532	ECA1CM102	CAP,E 1000UF/16V
C534	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C551	**ECA1VM331**	**CAP,E 330UF/35V**
C552	**ECA1CM331**	**CAP,E 330UF/16V**
C553	**ECA1CM331**	**CAP,E 330UF/16V**
C554	ECKD2H561KB	CAP,C 560PF–K–500V
C555	**ECEA2EU220**	**CAP,E 22UF/250V**
C556	**ECA1CM102**	**CAP,E 1000UF/16V**
C557	ECKD2H102KB	CAP,C .001UF–K–500V
C558	ECA1CM221	CAP,E 220UF/16V
C559	ECA1HM220	CAP,E 22UF/50V
C560	**ECEA1HN2R2U**	**CAP,E 2.2UF/50V**
C561	ECKD2H561KB	CAP,C 560PF–K–500V
C562	ECKD2H561KB	CAP,C 560PF–K–500V
C563	**ECWH12H153JS**	**CAP,P .015UF–J–1.2KV**
C564	**ECWH12H152JS**	**CAP,P .0015UF–J–1.2KV**
C565	**ECKD3D821JB**	**CAP,C 820PF–J–2KV**
C566	**ECKD3D181JB**	**CAP,C 180PF–J–2KV**
C567	**ECQM4562JZ**	**CAP,P 5600PF–J–400V**
C568	**ECQM4473JZ**	**CAP,P .047UF–J–400V**
C569	**ECWF2624JBK**	**CAP,M .62UF–J–200V**
C571	ECA1CM471	CAP,E 470UF/16V
C572	ECA1EM100	CAP,E 10UF/25V
C573	ECA1CM101	CAP,E 100UF/16V
C574	ECKD2H471KB	CAP,C 470PF–K–500V
C601	ECUX1H102KBX	CAP,C .001UF–K–50V
C604	ECUX1H150JUX	CAP,C 15PF–J–50V
C605	ECUX1H332KBX	CAP,C .0033UF–K–50V
C606	ECA1HM010	CAP,E 1.0UF/50V
C754	ECQB1H104KF	CAP,P .1UF–K–50V
C755	ECQB1H104KF	CAP,P .1UF–K–50V
C756	ECA1CM221	CAP,E 220UF/16V
C757	ECA1VM221	CAP,E 220UF/35V

PARTS LIST

REPLACEMENT PARTS LIST

(Models: CT–36G22V, CT–36G22CV, CT–36G22UV, CT–36G32V & CT–36G32UV)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
C759	**ECQE1395KN**	**CAP,P 3.9UF–K–100V**	C1837	ECUX1H104ZFX	CAP,C .1UF–Z–50V
C760	TACCV101T50V	CAP,C 100PF/50V	C1839	ECUX1H680JCX	CAP,C 68PF–J–50V
C801	**ECKD2H472PU**	**CAP,C .0047UF–P–500V**	C1840	ECUX1H680JCX	CAP,C 68PF–J–50V
C802	**ECKD2H472PU**	**CAP,C .0047UF–P–500V**	C2104	ECA1CM102	CAP,E 1000UF/16V
C803	**ECKD2H472PU**	**CAP,C .0047UF–P–500V**			*CT–36G32V CT–36G32UV*
C804	ECKD2H472PU	CAP,C .0047UF–P–500V	C2105	ECA0JM101	CAP,E 100UF/6.3V
C805	**ECOS2DA471BB**	**CAP,E 470UF/160V**			*CT–36G32V CT–36G32UV*
C806	**ECOS2DA471BB**	**CAP,E 470UF/160V**	C2106	ECA1HMR47	CAP,E .47UF/50V
C807	ECA1HM2R2	CAP,E 2.2UF/50V			*CT–36G32V CT–36G32UV*
C808	ECA1CM101	CAP,E 100UF/16V	C2108	ECA1CM330	CAP,E 33UF/16V
C809	**ECOS2DG151DG**	**CAP,E 151UF/200V**			*CT–36G32V CT–36G32UV*
C810	**ECQU2A153MN**	**CAP,P .015UF–M–250VAC**	C2109	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C811	**ECQU2A153MN**	**CAP,P .015UF–M–250VAC**			*CT–36G32V CT–36G32UV*
C812	**ECQU2A224MV**	**CAP,P .22F–M–250V**	C2111	ECEA1HFSR22	CAP,E .22UF/50V
C814	ECQB1H333JF	CAP,P .033UF–J–50V			*CT–36G32V CT–36G32UV*
C815	ECA1VHG221B	CAP,E 220UF–35V	C2114	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C818	ECKD3A821KB	CAP,C 820PF–K–1KVDC			*CT–36G32V CT–36G32UV*
C820	**ECEA1JGE100**	**CAP,E 10UF/63V**	C2115	ECA1HM100	CAP,E 10UF/50V
C821	ECKD3A561KB	CAP,C 560PF–K–1KV			*CT–36G32V CT–36G32UV*
C822	**ECA1EM221**	**CAP,E 220UF/25V**	C2116	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C823	**ECEA160V33Z**	**CAP,E 33UF/160V**			*CT–36G32V CT–36G32UV*
C824	ECKD3A331KB	CAP,C 330PF–K–1KVDC	C2118	ECUX1H270JCX	CAP,C 27PF–J–50V
C825	ECKD3A471KB	CAP,C 470PF–K–1KV			*CT–36G32V CT–36G32UV*
C1801	TCUX1H103ZFN	CAP,C .01UF–Z–50V	C2119	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C1802	ECQB1H154JF	CAP,P .15UF–J–50V			*CT–36G32V CT–36G32UV*
C1803	ECEA1HKAR22	CAP,E .22UF/50V	C2120	ECEA1HFSR47	CAP,E .47UF/50V
C1804	ECEA1HKAR22	CAP,E .22UF/50V			*CT–36G32V CT–36G32UV*
C1805	ECUX1H333ZFX	CAP,C .033UF–Z–50V	C2121	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C1806	TCUX1H103ZFN	CAP,C .01UF–Z–50V			*CT–36G32V CT–36G32UV*
C1807	ECEA1CKA470	CAP,E 47UF/16V	C2123	ECUX1H270JCX	CAP,C 27PF–J–50V
C1808	TCUX1H103ZFN	CAP,C .01UF–Z–50V			*CT–36G32V CT–36G32UV*
C1809	ECEA1CKA470	CAP,E 47UF/16V	C2124	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C1810	ECUX1H104ZFX	CAP,C .1UF–Z–50V			*CT–36G32V CT–36G32UV*
C1811	TCUX1H103ZFN	CAP,C .01UF–Z–50V	C2125	ECA1CM100	CAP,E 10UF/16V
C1812	TCUX1H103ZFN	CAP,C .01UF–Z–50V			*CT–36G32V CT–36G32UV*
C1813	TCUX1H103ZFN	CAP,C .01UF–Z–50V	C2126	ECA1HMR22	CAP,E .22UF/50V
C1814	ECEA1CKA470	CAP,E 47UF/16V			*CT–36G32V CT–36G32UV*
C1815	ECUX1H104ZFX	CAP,C .1UF–Z–50V	C2201	AP335K016CAE	CAP,T 3.3UF/16V
C1816	TCUX1H103ZFN	CAP,C .01UF–Z–50V	C2202	ECA1EM4R7	CAP,E 4.7UF/25V
C1817	TCUX1H103ZFN	CAP,C .01UF–Z–50V	C2203	ECA1HM010	CAP,E 1.0UF/50V
C1818	ECEA1CKA100	CAP,E 10UF/16V	C2204	ECA1EM4R7	CAP,E 4.7UF/25V
C1819	ECUX1H104ZFX	CAP,C .1UF–Z–50V	C2205	ECA1EM4R7	CAP,E 4.7UF/25V
C1820	ECEA1CKA470	CAP,E 47UF/16V	C2206	ECA1EM4R7	CAP,E 4.7UF/25V
C1821	ECUX1H150JCX	CAP,C 15PF–J–50V	C2207	ECA1EM4R7	CAP,E 4.7UF/25V
C1822	ECUX1H120JCX	CAP,C 12PF–J–50V	C2208	ECA1EM4R7	CAP,E 4.7UF/25V
C1823	ECUX1H680JCX	CAP,C 68PF–J–50V	C2209	ECA1CM101	CAP,E 100UF/16V
C1826	TCUX1H103ZFN	CAP,C .01UF–Z–50V	C2210	ECA1HMR33	CAP,E .33UF/50V
C1827	TCUX1H103ZFN	CAP,C .01UF–Z–50V	C2211	ECEA1HFSR68	CAP,E .68UF–50V
C1828	TCUX1H103ZFN	CAP,C .01UF–Z–50V	C2212	ECA1HM2R2	CAP,E 2.2UF/50V
C1829	ECUX1H104ZFX	CAP,C .1UF–Z–50V	C2213	ECA1EM100	CAP,E 10UF/25V
C1830	ECUX1H151JCX	CAP,C 150PF–J–50V	C2214	ECQB1H104JF	CAP,P .1UF–J–50V
C1831	ECUX1H104ZFX	CAP,C .1UF–Z–50V	C2215	ECQB1H223JF	CAP,P .022UF–J–50V
C1832	ECUX1H104ZFX	CAP,C .1UF–Z–50V	C2216	ECUX1H332KBX	CAP,C .0033UF–K–50V
C1833	ECUX1H104ZFX	CAP,C .1UF–Z–50V	C2217	ECEA1HN010U	CAP,E 1UF/50V
C1835	ECEA1CKA100	CAP,E 10UF/16V	C2218	ECEA1HN010U	CAP,E 1UF/50V
C1836	ECUX1H680JCX	CAP,C 68PF–J–50V	C2219	AP106K016CAE	CAP,T 10UF/16V

PARTS LIST

REPLACEMENT PARTS LIST

(Models: CT–36G22V, CT–36G22CV, CT–36G22UV, CT–36G32V & CT–36G32UV)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C2220	ECEA1CN100U	CAP,E 10UF–16V
C2221	TCUX1H103KBN	CAP,C .01UF–K–50V
C2222	ECUX1H472KBX	CAP,C .0047UF–K–50V
C2301	ECA1EM102	CAP,E 1000UF/25V
C2302	ECA1EM100	CAP,E 10UF/25V
C2303	ECUX1H392KBX	CAP,C .0039UF–K–50V
C2304	ECUX1H392KBX	CAP,C .0039UF–K–50V
C2305	ECA1EM100	CAP,E 10UF/25V
C2307	ECA1CM102	CAP,E 1000UF/16V
C2308	ECEA1EN470U	CAP,E 47UF/25V
C2309	ECQB1H104JF	CAP,P .1UF–J–50V
C2313	ECA1CM101	CAP,E 100UF/16V
C2314	ECQB1H104JF	CAP,P .1UF–J–50V
C2315	ECA1EM100	CAP,E 10UF/25V
C2316	ECA1CM101	CAP,E 100UF/16V
C2317	ECEA1EN470U	CAP,E 47UF/25V
C2318	ECUX1H152KBX	CAP,C .0015UF–K–50V
C2319	ECUX1H152KBX	CAP,C .0015UF–K–50V
C2320	ECA1CM101	CAP,E 100UF/16V
C2325	ECA1CM102	CAP,E 1000UF/16V
C2331	ECEA1CN100U	CAP,E 10UF–16V
C2332	ECEA1CN100U	CAP,E 10UF–16V
C2333	ECA1HM0R1	CAP,E 0.1UF/50V
C2334	ECUX1H472KBX	CAP,C .0047UF–K–50V
C2335	ECA1CM470	CAP,E 47UF/16V
C2336	ECQB1H104JF	CAP,P .1UF–J–50V
C2337	ECA1HM0R1	CAP,E 0.1UF/50V
C2338	ECA1HM4R7	CAP,E 4.7UF/50V
C2339	ECA1EM100	CAP,E 10UF/25V
C2340	ECA1HMR47	CAP,E .47UF/50V
C2341	ECA1HM4R7	CAP,E 4.7UF/50V
C2342	ECA1HM4R7	CAP,E 4.7UF/50V
C2343	ECA1HM4R7	CAP,E 4.7UF/50V
C2344	ECUX1H472KBX	CAP,C .0047UF–K–50V
C2345	ECA1HM0R1	CAP,E 0.1UF/50V
C2346	ECA1CM470	CAP,E 47UF/16V
C2347	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C2350	ECA1EM100	CAP,E 10UF/25V
C2351	ECEA1HN010U	CAP,E 1UF/50V
C2352	ECA1EM100	CAP,E 10UF/25V
C2353	ECEA1HN010U	CAP,E 1UF/50V
C2358	ECA1CM221	CAP,E 220UF/16V
C3011	ECA1HM010	CAP,E 1.0UF/50V
C3012	ECA1HM010	CAP,E 1.0UF/50V
C3013	ECA1EM100	CAP,E 10UF/25V
C3014	ECA1EM100	CAP,E 10UF/25V
C3015	ECA1EM100	CAP,E 10UF/25V
C3016	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C3017	TCUX1H103KBN	CAP,C .01UF–K–50V
C3018	ECA1HM010	CAP,E 1.0UF/50V
C3019	ECA1HM010	CAP,E 1.0UF/50V
C3020	ECA1CM470	CAP,E 47UF/16V
C3022	ECA1EM220	CAP,E 22UF/25V
C3023	ECA1CM470	CAP,E 47UF/16V
C3024	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C3025	ECA1EM220	CAP,E 22UF/25V
C3071	ECA1EM220	CAP,E 22UF/25V
C3072	TCUX1H103KBN	CAP,C .01UF–K–50V
C3201	ECA1CM470	CAP,E 47UF/16V
C3202	ECQB1H473JF	CAP,P .047UF–J–50V
C3203	TCUX1H103KBN	CAP,C .01UF–K–50V
C3204	TCUX1H103KBN	CAP,C .01UF–K–50V
C3206	ECA1EM220	CAP,E 22UF/25V
C3207	TCUX1H103KBN	CAP,C .01UF–K–50V
C3209	ECUX1H680JCX	CAP,C 68PF–J–50V
C4304	ECEA1CKA100	CAP,E 10UF/16V
C4307	ECEA1CKN100	CAP,E 10UF/16V
C4313	ECUX1H391KBX	CAP,C 390PF–K–50V
C4314	ECEA1HKAR47	CAP,E .47UF/50V
C4315	ECUX1H152KBX	CAP,C .0015UF–K–50V
C4316	ECEA0JKA331	CAP,E 330UF/6.3V
C4317	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C4319	ECUX1H391JCX	CAP,C 390PF–J–50V
C4320	ECUX1H681KBX	CAP,C 680PF–K–50V
C4357	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C4358	ECA1CM470	CAP,E 47UF/16V
C4411	ECA1EM100	CAP,E 10UF/25V
C4412	ECA1CM100	CAP,E 10UF/16V
C4414	ECA1CM100	CAP,E 10UF/16V
C4415	ECA1EM100	CAP,E 10UF/25V
C4416	ECA1EM100	CAP,E 10UF/25V
C4801	ECA1VM470	CAP,E 47UF/35V
C4803	ECQV1H334JM	CAP,P .33UF–J–50V
C4820	ECA1HM2R2	CAP,E 2.2UF/50V
		DIODES
D001	ERA15–01	DIODE
D002	MA165	DIODE
D003	MA4047M	DIODE, ZENER
D006	MA4330H	DIODE
D008	MA165	DIODE
D009	MA165	DIODE
D011	MA165	DIODE
D016	MA165	DIODE
D017	MA165	DIODE
D050	MA4056M	DIODE
D051	MA4056M	DIODE
D451	ERA15–01	DIODE
D452	MA4047M	DIODE, ZENER
D501	MA4082L	DIODE
D531	**AS01**	**DIODE**
D532	**MA4062L**	**DIODE**
D551	**TVSRU2N**	**DIODE**
D554	**BYD33G–143**	**DIODE**
D555	MA165	DIODE
D556	MA4360H	DIODE, ZENER
D557	**BYD33G–143**	**DIODE**
D558	**RS3FS**	**DIODE**
D559	**BYD33G–113**	**DIODE**
D560	MA165	DIODE
D561	**BYD33G–143**	**DIODE**
D751	MA2270B	DIODE
D801	**RM10BLFA1**	**DIODE**

PARTS LIST

REPLACEMENT PARTS LIST

(Models: CT–36G22V, CT–36G22CV, CT–36G22UV, CT–36G32V & CT–36G32UV)

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REF NO.	PART NO.	DESCRIPTION
D802	**RM10BLFA1**	**DIODE**
D805	**TRPW5B0M030D**	**THERMISTOR**
D806	MA4047H	DIODE
D807	MA165	DIODE
D809	**RU3YX–M**	**DIODE**
D820	EU02V1	DIODE
D821	EU02V1	DIODE
D822	EU02V1	DIODE
D823	RL30A	DIODE
D824	EU02V1	DIODE
D825	**TVSSR2KL**	**DIODE, PROTECTION**
D826	EU02V1	DIODE
D829	MA165	DIODE
D830	MA4270M	DIODE
D2101	MA3330M	DIODE
		CT–36G32V CT–36G32UV
D2303	MA4068M	DIODE, ZENER
D3001	MA165	DIODE
D3003	MA4062L	DIODE
D3011	MA3110M	DIODE, ZENER
D3014	MA3110M	DIODE, ZENER
D3015	MA3110M	DIODE, ZENER
D3018	MA3110M	DIODE, ZENER
D3019	MA3110M	DIODE, ZENER
D3020	MA3110M	DIODE, ZENER
D3021	MA3110M	DIODE, ZENER
D3022	MA3110M	DIODE, ZENER
D3023	MA3110M	DIODE, ZENER
D3024	MA3110M	DIODE, ZENER
D3025	MA3110M	DIODE, ZENER
D3026	MA3110M	DIODE, ZENER
D3027	MA151WK	DIODE
D4301	MA3036H	DIODE
D4801	MA165	DIODE
D4802	MA165	DIODE
D4803	MA165	DIODE
		FUSES
F801	**0BA1C63NU100**	**FUSE (6.3A–125V)**
		INTEGRATED CIRCUITS
IC001	MN1673265T9E	INT CKT
		CT–36G32V CT–36G32UV
IC001	MN1673265T9G	INT CKT
		CT–36G32V CT–36G22UV
		CT–36G22CV
IC002	24LC02BIP	INT CKT
IC003	RPM–637CBRS1	IR RECEIVER, REMOTE CONTROL
IC101	**AN5165K**	**INT CKT**
IC451	**LA7838**	**INT CKT**
IC551	AN7809	INT CKT
IC552	AN78M05	PLUS 5V AVR
IC801	**0N3131R**	**INT CKT**
IC803	**STR58041A**	**INT CKT**
IC1801	M65617SP	PIP CONTROLLER
IC2101	AN5170K	INT CKT
		CT–36G32V CT–36G32UV
IC2201	AN5819K	INT CKT

REF NO.	PART NO.	DESCRIPTION
IC2301	AN7147N	INT CKT
IC2321	CXA2021S	INT CKT
IC2402	TC4066BP	INT CKT
IC3001	M52055P	INT CKT
IC3031	M52055P	INT CKT
IC4402	M52055P	INT CKT
IC4801	LA6515	INT CKT
		COILS
L001	TSKA074	FERRITE BEAD
L002	TLTACT390K	COIL, PEAKING 39UH
L003	TLUABTA2R2K	COIL, PEAKING 2.2UH
L004	TLUABTA2R2K	COIL, PEAKING 2.2UH
L005	TSKA074	FERRITE BEAD
L006	TSKA072	FERRITE BEAD
L008	TLUABTA470K	COIL, PEAKING 47UH
L103	TLTACT120J	COIL, PEAKING 12UH
L105	EIV7EN053B	COIL, VCO
L106	TLTACT180J	COIL, PEAKING 18UH
L351	TLUABTA101K	COIL, PEAKING 100UH
L551	**TLH15603P**	**COIL, HORIZONTAL LINEARITY**
L554	TSKA072	FERRITE BEAD
L555	TSKA072	FERRITE BEAD
L556	TSKA072	FERRITE BEAD
L751	**ELC18B301L**	**COIL, CHOKE**
L752	EXCELDR35	FERRITE BEAD
L801	**ELF20N020A**	**COIL, 2UH**
L803	**ELF17N007A**	**LINE FILTER**
L804	TSKA076	FERRITE BEAD
L805	TSKA076	FERRITE BEAD
L1801	TLTACT1R5K	COIL, PEAKING
L1803	TLTACT2R2K	COIL, PEAKING 2.2UH
L1804	TLTACT150J	COIL, PEAKING 15UH
L1806	TLTACT1R0K	COIL, PEAKING 1UH
L1807	TLTACT1R0K	COIL, PEAKING 1UH
L1808	EXCELDR25	COIL
L2101	TLTACT120K	COIL, PEAKING 12UH
		CT–36G32V CT–36G32UV
L2103	TLTACT150K	COIL, PEAKING 15UH
		CT–36G32V CT–36G32UV
L2105	TLTACT1R2K	COIL, PEAKING 1.2UH
		CT–36G32V CT–36G32UV
L2106	TLTACT560K	COIL, PEAKING 56UH
		CT–36G32V CT–36G32UV
L2107	TLTACT1R2K	COIL, PEAKING 1.2UH
		CT–36G32V CT–36G32UV
L2109	EIV7EN053B	COIL, VCO
		CT–36G32V CT–36G32UV
L2201	TLTACT102J	COIL, PEAKING 1000UH
L2202	TLTACT471J	COIL, PEAKING 470UH
L3201	EFDEN645B35B	DELAY LINE
L3202	EQK7ES731B	COIL, 730UH
L3203	TLTACT180K	COIL, PEAKING 18UH
L4301	TLTACT2R2K	COIL, PEAKING 2.2UH
		TRANSISTORS
Q001	MSD601–RT1	TRANSISTOR
Q002	JC501PQ	TRANSISTOR

PARTS LIST

REPLACEMENT PARTS LIST

(Models: CT-36G22V, CT-36G22CV, CT-36G22UV, CT-36G32V & CT-36G32UV)

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REF NO.	PART NO.	DESCRIPTION
Q003	MSB709–RT1	TRANSISTOR
Q004	MSB709–RT1	TRANSISTOR
Q302	MSD601–RT1	TRANSISTOR
Q303	MSB709–RT1	TRANSISTOR
Q304	MSD601–RT1	TRANSISTOR
Q305	MSD601–RT1	TRANSISTOR
Q306	MSB709–RT1	TRANSISTOR
Q307	MSB709–RT1	TRANSISTOR
Q351	2SC3063	TRANSISTOR
Q352	2SC3063	TRANSISTOR
Q353	2SC3063	TRANSISTOR
Q451	MSD601–RT1	TRANSISTOR
Q452	MSD601–RT1	TRANSISTOR
Q501	**2SC4212H**	**TRANSISTOR**
Q551	**BU2508DF**	**TRANSISTOR**
Q751	JC501PQ	TRANSISTOR
Q752	JA101PQ	TRANSISTOR
Q753	**2SD1266**	**TRANSISTOR**
Q801	2SC1685RS	TRANSISTOR
Q802	2SC1384RS	TRANSISTOR
Q804	2SA1767Q	TRANSISTOR
Q1801	MSD601–RT1	TRANSISTOR
Q1802	MSD601–RT1	TRANSISTOR
Q1803	MSD601–RT1	TRANSISTOR
Q1804	MSB709–RT1	TRANSISTOR
Q1805	MSB709–RT1	TRANSISTOR
Q2101	MSD601–RT1	TRANSISTOR
		CT–36G32V CT–36G32UV
Q2302	MSB709–RT1	TRANSISTOR
Q2303	MSD601–RT1	TRANSISTOR
Q2305	MSB709–RT1	TRANSISTOR
Q2401	MSD601–RT1	TRANSISTOR
Q2402	MSD601–RT1	TRANSISTOR
Q2403	MSD601–RT1	TRANSISTOR
Q2404	MSD601–RT1	TRANSISTOR
Q2405	MSD601–RT1	TRANSISTOR
Q2406	MSD601–RT1	TRANSISTOR
Q3001	MSD601–RT1	TRANSISTOR
Q3011	MSD601–RT1	TRANSISTOR
Q3012	MSD601–RT1	TRANSISTOR
Q3013	MSD601–RT1	TRANSISTOR
Q3014	MSB709–RT1	TRANSISTOR
Q3201	MSD601–RT1	TRANSISTOR
Q3202	MSD601–RT1	TRANSISTOR
Q3203	MSD601–RT1	TRANSISTOR
Q3204	MSD601–RT1	TRANSISTOR
Q3205	MSD601–RT1	TRANSISTOR
Q4309	MSB709–RT1	TRANSISTOR
Q4310	MSD601–RT1	TRANSISTOR
Q4311	MSB709–RT1	TRANSISTOR
Q4312	MSD601–RT1	TRANSISTOR
Q4313	MSD601–RT1	TRANSISTOR
Q4315	2SC1384Q	TRANSISTOR
		RELAYS
RL801	**TSEH8007**	**RELAY**

REF NO.	PART NO.	DESCRIPTION
		RESISTORS
R002	ERJ6GEYJ182	RES,M1.8K–J–1/10
R003	ERJ6GEYJ562	RES,M5.6K–J–1/10
R004	ERDS1TJ181	RES,C180–J–1/2
R005	ERDS2TJ101	RES,C100–J–1/4
R006	ERJ6GEYJ391	RES,M390–J–1/10
R007	ERJ6GEYJ561	RES,M560–J–1/10
R008	ERJ6GEYJ562	RES,M5.6K–J–1/10
R010	ERJ6GEYJ154	RES,M150K–J–1/10
R011	ERJ6GEYJ684	RES,M680K–J–1/10
R012	ERJ6GEYJ473	RES,M47K–J–1/10
R016	ERJ6GEYJ472	RES,M4.7K–J–1/10
R017	ERDS2TJ472	RES,C4.7K–J–1/4
R018	ERJ6GEYJ101	RES,M100–J–1/10
R019	ERDS2TJ101	RES,C100–J–1/4
R020	ERJ6GEYJ474	RES,M470K–J–1/10
R021	ERJ6GEYJ101	RES,M100–J–1/10
R022	ERJ6GEYJ101	RES,M100–J–1/10
R023	ERJ6GEYJ102	RES,M1K–J–1/10
R025	ERJ6GEYJ103	RES,M10K–J–1/10
R027	ERDS2TJ103	RES,C10K–J–1/4
R028	ERJ6GEYJ333	RES,M33K–J–1/10
		CT–36G22V CT–36G22UV
		CT–36G22CV
R029	ERJ6GEYJ103	RES,M10K–J–1/10
		CT–36G32V CT–36G32UV
R029	ERJ6GEYJ752	RES,M7.5K–J–1/10
		CT–36G22V CT–36G22UV
		CT–36G22CV
R030	ERJ6GEYJ102	RES,M1K–J–1/10
R031	ERJ6GEYJ471	RES,M470–J–1/10
R032	ERJ6ENF1002	RES,M10K–F–1/10
R033	ERJ6GEYJ222	RES,M2.2K–J–1/10
R034	ERJ6GEYJ222	RES,M2.2K–J–1/10
R035	ERJ6GEYJ332	RES,M3.3K–J–1/10
R036	ERJ6GEYJ562	RES,M5.6K–J–1/10
R037	ERJ6GEYJ103	RES,M10K–J–1/10
R038	ERJ6GEYJ223	RES,M22K–J–1/10
R039	ERJ6GEYJ102	RES,M1K–J–1/10
R040	ERJ6GEYJ223	RES,M22K–J–1/10
R041	ERDS2TJ471	RES,C470–J–1/4
R042	ERJ6GEYJ223	RES,M22K–J–1/10
R043	ERJ6GEYJ223	RES,M22K–J–1/10
R044	ERJ6GEYJ471	RES,M470–J–1/10
R045	ERDS2TJ102	RES,C1K–J–1/4
R048	ERJ6GEYJ221	RES,M220–J–1/10
R049	ERJ6GEYJ221	RES,M220–J–1/10
R050	ERJ6GEYJ223	RES,M22K–J–1/10
R051	ERDS2TJ471	RES,C470–J–1/4
R052	ERJ6GEYJ103	RES,M10K–J–1/10
		CT–36G32V CT–36G32UV
R053	ERJ6GEYJ103	RES,M10K–J–1/10
		CT–36G22V CT–36G22UV
		CT–36G22CV
R057	ERJ6GEYJ103	RES,M10K–J–1/10
R058	ERJ6GEYJ103	RES,M10K–J–1/10

REPLACEMENT PARTS LIST

(Models: CT–36G22V, CT–36G22CV, CT–36G22UV, CT–36G32V & CT–36G32UV)

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REF. NO.	PART NO.	DESCRIPTION
R060	ERJ6GEYJ102	RES,M1K–J–1/10
R065	ERJ6GEYJ222	RES,M2.2K–J–1/10
R066	ERJ6GEYJ222	RES,M2.2K–J–1/10
R067	ERJ6GEYJ222	RES,M2.2K–J–1/10
R068	ERJ6GEYJ222	RES,M2.2K–J–1/10
R101	ERJ6GEYJ750	RES,M75–J–1/10
R102	ERJ6GEYJ683	RES,M68K–J–1/10
R103	ERJ6GEYJ183	RES,M18K–J–1/10
R104	ERJ6GEYJ681	RES,M680–J–1/10
R105	ERJ6GEYJ681	RES,M680–J–1/10
R107	ERJ6GEYJ471	RES,M470–J–1/10
R108	ERJ6GEYJ222	RES,M2.2K–J–1/10
R152	ERDS2TJ183	RES,C18K–J–1/4
R153	ERJ6GEYJ223	RES,M22K–J–1/10
R154	ERDS2TJ393	RES,C39K–J–1/4
R201	ERJ6GEYJ471	RES,M470–J–1/10
R202	ERJ6GEYJ682	RES,M6.8K–J–1/10
R203	ERJ6GEYJ562	RES,M5.6K–J–1/10
R303	ERJ6GEYJ682	RES,M6.8K–J–1/10
R304	ERJ6GEYJ332	RES,M3.3K–J–1/10
R305	ER0S2CKF3001	RES,M3K–F–1/4
R306	ERJ6ENF1541	RES,M1.54K–F–1/10
R308	ERDS2TJ102	RES,C1K–J–1/4
R309	ERJ6GEYJ683	RES,M68K–J–1/10
R310	ERJ6GEYJ273	RES,M27K–J–1/10
R311	ERJ6GEYJ185	RES,M1.8MEG–J–1/10W
R313	ERJ6GEYJ471	RES,M470–J–1/10
R314	ERDS2TJ471	RES,C470–J–1/4
R317	ERJ6GEYJ684	RES,M680K–J–1/10
R319	ERJ6GEYJ122	RES,M1.2K–J–1/10
R320	ERJ6GEYJ102	RES,M1K–J–1/10
R324	ERJ6GEYJ222	RES,M2.2K–J–1/10
R325	ERJ6GEYJ102	RES,M1K–J–1/10
R326	ERJ6GEYJ332	RES,M3.3K–J–1/10
R327	ERJ6GEYJ392	RES,M3.9K–J–1/10
R328	ERJ6GEYJ102	RES,M1K–J–1/10
R335	ERJ6GEYJ471	RES,M470–J–1/10
R351	ERG2FJ123H	RES,M12K–J–2W
R352	ERG2FJ123H	RES,M12K–J–2W
R353	ERG2FJ123H	RES,M12K–J–2W
R354	ERDS1TJ272	RES,C2.7K–J–1/2
R355	ERDS1TJ272	RES,C2.7K–J–1/2
R356	ERDS1TJ272	RES,C2.7K–J–1/2
R357	ERDS2TJ271	RES,C270–J–1/4
R358	ERDS2TJ271	RES,C270–J–1/4
R359	ERDS2TJ271	RES,C270–J–1/4
R360	ERDS2TJ821	RES,C820–J–1/4
R361	ERDS2TJ821	RES,C820–J–1/4
R362	ERDS2TJ821	RES,C820–J–1/4
R363	ERDS2TJ101	RES,C100–J–1/4
R364	ERDS2TJ101	RES,C100–J–1/4
R365	ERDS2TJ101	RES,C100–J–1/4
R401	ERJ6GEYJ102	RES,M1K–J–1/10
R451	ERDS1FJ1R2	RES,C1.2–J–1/2
R452	ERDS1FJ3R3	RES,C3.3–J–1/2
R454	ERJ6GEYJ393	RES,M39K–J–1/10
R455	ERJ6GEYJ183	RES,M18K–J–1/10
R456	ERJ6GEYJ223	RES,M22K–J–1/10
R457	ERJ6GEYJ272	RES,M2.7K–J–1/10
R458	ERJ6GEYJ333	RES,M33K–J–1/10
R459	ERJ6GEYJ683	RES,M68K–J–1/10
R460	ERDS2TJ102	RES,C1K–J–1/4
R462	ERJ6GEYJ473	RES,M47K–J–1/10
R463	ERJ6GEYJ473	RES,M47K–J–1/10
R464	ERDS1FJ1R5	RES,C1.5–J–1/2
R465	ERDS2TJ103	RES,C10K–J–1/4
R466	ERJ6GEYJ103	RES,M10K–J–1/10
R467	ERJ6GEYJ104	RES,M100K–J–1/10
R468	ERJ6GEYJ101	RES,M100–J–1/10
R469	ERJ6GEYJ220	RES,M22–J–1/10
R470	ERDS2TJ152	RES,C1.5K–J–1/4
R471	ERJ6GEYJ223	RES,M22K–J–1/10
R501	ERJ6GEYJ102	RES,M1K–J–1/10
R502	ERDS2TJ562	RES,C5.6K–J–1/4
R503	ERJ6GEYJ822	RES,M8.2K–J–1/10
R504	ERJ6GEYJ561	RES,M560–J–1/10
R505	ERJ6GEYJ682	RES,M6.8K–J–1/10
R506	ERJ6GEYJ182	RES,M1.8K–J–1/10
R507	ERJ6GEYJ392	RES,M3.9K–J–1/10
R508	ERJ6GEYJ562	RES,M5.6K–J–1/10
R509	ERDS2TJ331	RES,C330–J–1/4
R510	**ERG3FJ242H**	**RES,M 2.4K–J–3W**
R511	**ERG3FJ242H**	**RES,M 2.4K–J–3W**
R512	ERG2FJ392H	RES,M3.9K–J–2W
R513	ERJ6GEYJ333	RES,M33K–J–1/10
R515	ERJ6GEYJ562	RES,M5.6K–J–1/10
R531	**ERD25FJ470**	**RES,C 47–J–1/4**
R532	**ERJ6ENF5362**	**RES,M 53.6K–F–1/10W**
R533	**ERJ6ENF1692**	**RES,M 16.9K–F–1/10**
R535	ERJ6GEYJ684	RES,M680K–J–1/10
R536	ERJ6GEYJ223	RES,M22K–J–1/10
R537	ERJ6GEYJ473	RES,M47K–J–1/10
R550	**ERDS1FJ1R8**	**RES,C 1.8–J–1/2**
R551	**ERDS1FJ1R8**	**RES,C 1.8–J–1/2**
R552	**ERDS1FJ1R0**	**RES,C 1.0–J–1/2**
R554	ERG3FJ180H	RES,M18–J–3W
		CT–36G32V CT–36G32UV
R554	ERG3FJ270H	RES,M27–J–3W
		CT–36G22V CT–36G22UV
		CT–36G22CV
R556	ERDS2TJ272	RES,C2.7K–J–1/4
R557	ERDS2TJ103	RES,C10K–J–1/4
R558	**ERQ2CJP1R3**	**RES,F 1.3–J–2W**
R559	ERG2FJ683H	RES,M12K–J–2W
R560	ERG2FJ102H	RES,M1K–J–2W
R561	ERG2FJ102H	RES,M1K–J–2W
R563	ERDS2TJ563	RES,C56K–J–1/4
R564	ERDS2TJ683	RES,C68K–J–1/4
R565	ERDS2TJ103	RES,C10K–J–1/4
R566	**ERDS1FJ1R0**	**RES,C 1.0–J–1/2**
R569	ERG2FJ683H	RES,M12K–J–2W
		CT–36G32V CT–36G32UV

PARTS LIST

REPLACEMENT PARTS LIST

(Models: CT–36G22V, CT–36G22CV, CT–36G22UV, CT–36G32V & CT–36G32UV)

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REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
R570	ERDS1FJ820	RES,C82–J–1/2	R1815	ERJ6GEYJ471	RES,M470–J–1/10
R602	ERJ6GEYJ331	RES,M330–J–1/10	R1816	ERJ6GEYJ101	RES,M100–J–1/10
R603	ERJ6GEYJ331	RES,M330–J–1/10	R1819	ERJ6GEYJ101	RES,M100–J–1/10
R604	ERJ6GEYJ331	RES,M330–J–1/10	R1822	ERJ6GEYJ682	RES,M6.8K–J–1/10
R614	ERJ6GEYJ332	RES,M3.3K–J–1/10	R1823	ERJ6GEYJ473	RES,M47K–J–1/10
R752	ERDS2TJ333	RES,C33K–J–1/4	R1825	ERJ6GEYJ471	RES,M470–J–1/10
R753	ERDS2TJ103	RES,C10K–J–1/4	R1827	ERJ6GEYJ102	RES,M1K–J–1/10
R754	ERG3FJ562	RES,M5.6K–J–3W	R1828	ERJ6GEYJ471	RES,M470–J–1/10
R755	ERDS2TJ563	RES,C56K–J–1/4	R1830	ERJ6GEYJ102	RES,M1K–J–1/10
R756	ERDS2TJ103	RES,C10K–J–1/4	R1856	ERJ6GEYJ153	RES,M15K–J–1/10
R757	ERDS2TJ224	RES,C220K–J–1/4	R2106	ERJ6GEYJ183	RES,M18K–J–1/10
R758	ERDS2TJ273	RES,C27K–J–1/4			*CT–36G32V CT–36G32UV*
R759	ERDS2TJ222	RES,C2.2K–J–1/4	R2109	ERJ6GEYJ683	RES,M68K–J–1/10
R760	EVND8AA03B53	CONTROL 5K			*CT–36G32V CT–36G32UV*
R761	EVND8AA03B14	CONTROL 10K	R2110	ERJ6GEYJ331	RES,M330–J–1/10
R762	ERDS2TJ182	RES,C1.8K–J–1/4			*CT–36G32V CT–36G32UV*
R763	ERDS2TJ183	RES,C18K–J–1/4	R2111	ERJ6GEYJ152	RES,M1.5K–J–1/10
R764	ERDS2TJ154	RES,C150K–J–1/4			*CT–36G32V CT–36G32UV*
R765	ERDS2TJ272	RES,C2.7K–J–1/4	R2112	ERJ6GEYJ331	RES,M330–J–1/10
R766	ERDS2TJ362	RES,C3.6K–J–1/4			*CT–36G32V CT–36G32UV*
R767	ERDS2TJ222	RES,C2.2K–J–1/4	R2113	ERJ6GEYJ102	RES,M1K–J–1/10
R768	**ERQ2CJP100**	**RES,F 10–J–2W**			*CT–36G32V CT–36G32UV*
R801	**ERF7ZK1R5**	**RES,W 1.5–K–7W**	R2114	ERJ6GEYJ681	RES,M680–J–1/10
R804	ERW12PK1R8	RES,W 1.8–K–1/2W			*CT–36G32V CT–36G32UV*
R805	ERDS2TJ274	RES,C270K–J–1/4	R2116	ERJ6GEYJ102	RES,M1K–J–1/10
R806	ERDS2TJ274	RES,C270K–J–1/4			*CT–36G32V CT–36G32UV*
R808	ERDS1FJ1R0	RES,C1.0–J–1/2	R2117	ERJ6GEYJ121	RES,M120–J–1/10
R809	ERDS1FJ1R0	RES,C1.0–J–1/2			*CT–36G32V CT–36G32UV*
R810	ERDS1FJ272	RES,C2.7K–J–1/2	R2118	EVND8AA03B14	CONTROL 10K
R812	ERDS1TJ183	RES,C18K–J–1/2			*CT–36G32V CT–36G32UV*
R813	ERJ6GEYJ562	RES,M5.6K–J–1/10	R2119	ERJ6GEYJ392	RES,M3.9K–J–1/10
R815	**ERC12ZGM825**	**RES,S 8.2MEG–M–1/2**			*CT–36G32V CT–36G32UV*
R818	**ERQ12HJR56**	**RES,F .56–J–1/2**	R2121	ERJ6GEYJ221	RES,M220–J–1/10
R820	ERDS2TJ153	RES,C15K–J–1/4			*CT–36G32V CT–36G32UV*
R821	ERDS2TJ392	RES,C3.9K–J–1/4	R2122	ERJ6GEYJ473	RES,M47K–J–1/10
R822	ERD50FJ474	RES,C470K–J–1/2W			*CT–36G32V CT–36G32UV*
R823	ERDS2TJ222	RES,C2.2K–J–1/4	R2123	ERJ6GEYJ473	RES,M47K–J–1/10
R824	ERG3FJ330	RES,M33–J–3W			*CT–36G32V CT–36G32UV*
R825	ERDS2TJ102	RES,C 1K–J–1/4	R2124	ERJ6GEYJ332	RES,M3.3K–J–1/10
R826	**ERF2AKR15**	**RES,W .15–K–2W**			*CT–36G32V CT–36G32UV*
R827	ERDS1FJ561	RES,C560–J–1/2	R2127	ERJ6GEYJ101	RES,M100–J–1/10
R828	ERG3FJ470	RES,M47–J–3W			*CT–36G32V CT–36G32UV*
R829	ERQ14AJ2R2	RES,F2.2–J–1/4	R2201	ERJ6GEYJ472	RES,M4.7K–J–1/10
R1801	ERJ6GEYJ301	RES,M300–J–1/10	R2202	ERJ6GEYJ153	RES,M15K–J–1/10
R1802	ERJ6GEYJ104	RES,M100K–J–1/10	R2203	ERJ6GEYJ104	RES,M100K–J–1/10
R1803	ERJ6GEYJ474	RES,M470K–J–1/10	R2204	ERJ6GEYJ473	RES,M47K–J–1/10
R1804	ERJ6GEYJ202	RES,M2K–J–1/10	R2205	ERJ6GEYJ154	RES,M150K–J–1/10
R1805	ERJ6GEYJ102	RES,M1K–J–1/10	R2206	ERJ6GEYJ102	RES,M1K–J–1/10
R1807	ERJ6GEYJ103	RES,M10K–J–1/10	R2207	ERJ6GEYJ102	RES,M1K–J–1/10
R1808	ERJ6GEYJ103	RES,M10K–J–1/10	R2208	ERJ6ENF9102	RES,M91K–F–1/10
R1809	ERJ6GEYJ473	RES,M47K–J–1/10	R2212	ERJ6GEYJ682	RES,M6.8K–J–1/10
R1810	ERJ6GEYJ103	RES,M10K–J–1/10	R2221	ERJ6GEYJ101	RES,M100–J–1/10
R1811	ERJ6GEYJ682	RES,M6.8K–J–1/10	R2301	ERQ2CJP1R8	RES,F1.8–J–2W
R1812	ERJ6GEYJ153	RES,M15K–J–1/10	R2302	ERJ6GEYJ182	RES,M1.8K–J–1/10
R1813	ERJ6GEYJ153	RES,M15K–J–1/10	R2303	ERJ6GEYJ103	RES,M10K–J–1/10
R1814	ERJ6GEYJ361	RES,M360–J–1/10	R2305	ERD25FJ2R2	RES,C2.2–J–1/4

PARTS LIST

REPLACEMENT PARTS LIST

(Models: CT–36G22V, CT–36G22CV, CT–36G22UV, CT–36G32V & CT–36G32UV)

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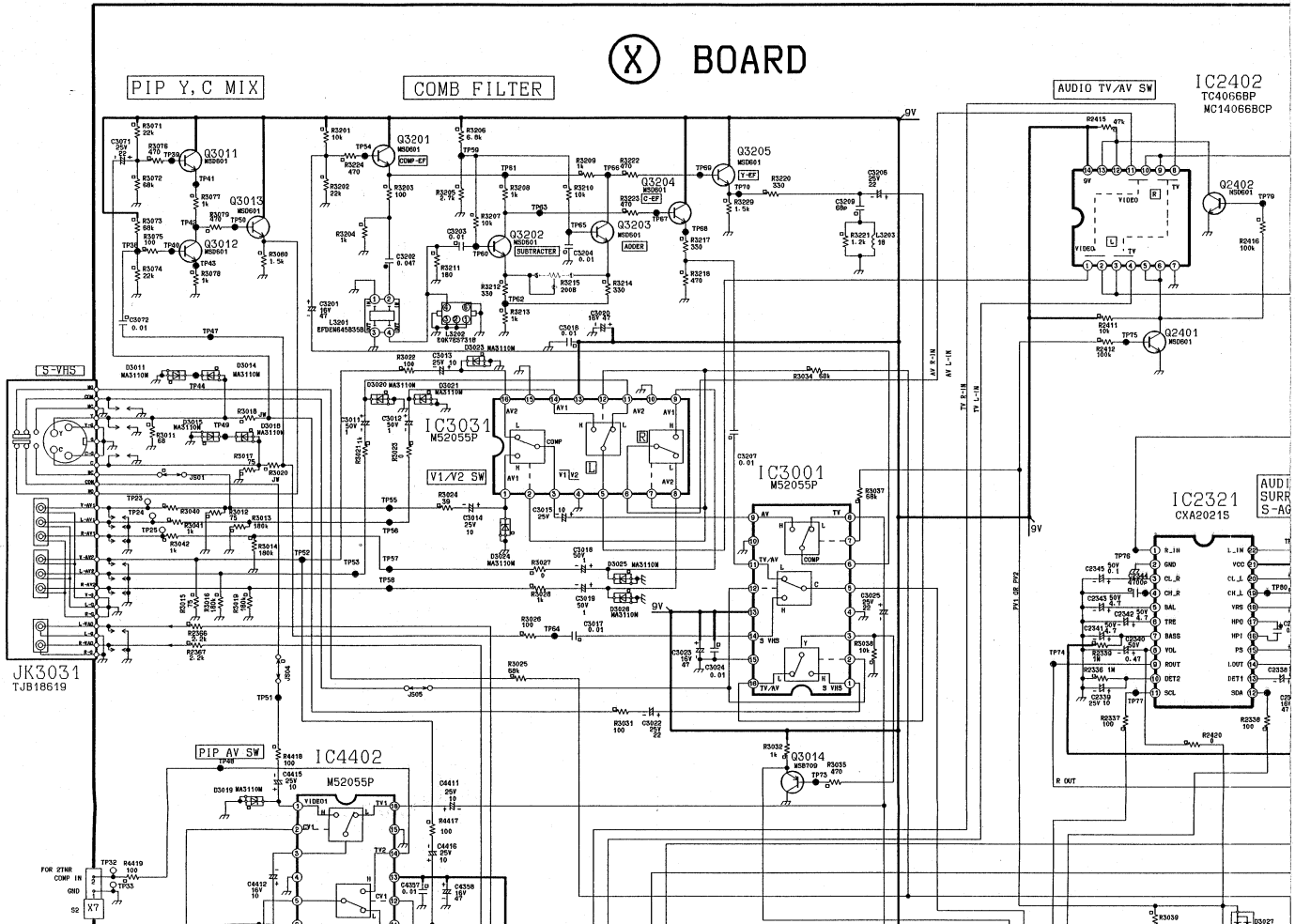
REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
R2306	ERD25FJ2R2	RES,C2.2–J–1/4	R3035	ERJ6GEYJ471	RES,M470–J–1/10
R2307	ERJ6GEYJ392	RES,M3.9K–J–1/10	R3037	ERJ6GEYJ683	RES,M68K–J–1/10
R2309	ERJ6GEYJ103	RES,M10K–J–1/10	R3038	ERJ6GEYJ103	RES,M10K–J–1/10
R2315	ERJ6GEYJ101	RES,M100–J–1/10	R3039	ERJ6GEYJ104	RES,M100K–J–1/10
R2316	ERJ6GEYJ472	RES,M4.7K–J–1/10	R3041	ERJ6GEYJ102	RES,M1K–J–1/10
R2319	ERJ6GEYJ223	RES,M22K–J–1/10	R3042	ERJ6GEYJ102	RES,M1K–J–1/10
R2321	ERJ6GEYJ182	RES,M1.8K–J–1/10	R3071	ERJ6GEYJ223	RES,M22K–J–1/10
R2322	ERJ6GEYJ103	RES,M10K–J–1/10	R3072	ERJ6GEYJ683	RES,M68K–J–1/10
R2323	ERDS2TJ682	RES,C6.8K–J–1/4	R3073	ERJ6GEYJ683	RES,M68K–J–1/10
R2324	ERJ6GEYJ331	RES,M330–J–1/10	R3074	ERJ6GEYJ223	RES,M22K–J–1/10
R2325	ERJ6GEYJ682	RES,M6.8K–J–1/10	R3075	ERJ6GEYJ101	RES,M100–J–1/10
R2326	ERJ6GEYJ103	RES,M10K–J–1/10	R3076	ERJ6GEYJ471	RES,M470–J–1/10
R2334	ERJ6GEYJ682	RES,M6.8K–J–1/10	R3077	ERJ6GEYJ102	RES,M1K–J–1/10
R2336	ERJ6GEYJ105	RES,M1.0MEG–J–1/10	R3078	ERJ6GEYJ102	RES,M1K–J–1/10
R2337	ERJ6GEYJ101	RES,M100–J–1/10	R3079	ERJ6GEYJ471	RES,M470–J–1/10
R2338	ERJ6GEYJ101	RES,M100–J–1/10	R3080	ERJ6GEYJ152	RES,M1.5K–J–1/10
R2339	ERJ6GEYJ105	RES,M1.0MEG–J–1/10	R3201	ERJ6GEYJ103	RES,M10K–J–1/10
R2340	ERJ6GEYJ102	RES,M1K–J–1/10	R3202	ERJ6GEYJ223	RES,M22K–J–1/10
R2341	ERJ6GEYJ102	RES,M1K–J–1/10	R3203	ERJ6GEYJ101	RES,M100–J–1/10
R2342	ERJ6GEYJ104	RES,M100K–J–1/10	R3204	ERJ6GEYJ102	RES,M1K–J–1/10
R2343	ERJ6GEYJ183	RES,M18K–J–1/10	R3205	ERJ6GEYJ272	RES,M2.7K–J–1/10
R2344	ERJ6GEYJ472	RES,M4.7K–J–1/10	R3206	ERJ6GEYJ682	RES,M6.8K–J–1/10
R2345	ERJ6GEYJ821	RES,M820–J–1/10	R3207	ERJ6GEYJ103	RES,M10K–J–1/10
R2347	ERJ6GEYJ102	RES,M1K–J–1/10	R3208	ERJ6GEYJ102	RES,M1K–J–1/10
R2348	ERJ6GEYJ102	RES,M1K–J–1/10	R3209	ERJ6GEYJ102	RES,M1K–J–1/10
R2349	ERJ6GEYJ104	RES,M100K–J–1/10	R3210	ERJ6GEYJ103	RES,M10K–J–1/10
R2350	ERJ6GEYJ183	RES,M18K–J–1/10	R3211	ERJ6GEYJ181	RES,M180–J–1/10
R2351	ERJ6GEYJ472	RES,M4.7K–J–1/10	R3212	ERJ6GEYJ331	RES,M330–J–1/10
R2352	ERJ6GEYJ821	RES,M820–J–1/10	R3213	ERJ6GEYJ102	RES,M1K–J–1/10
R2357	ERJ6GEYJ392	RES,M3.9K–J–1/10	R3214	ERJ6GEYJ331	RES,M330–J–1/10
R2366	ERJ6GEYJ222	RES,M2.2K–J–1/10	R3215	EVND8AA03B22	CONTROL 200 OHM
R2367	ERJ6GEYJ222	RES,M2.2K–J–1/10	R3217	ERJ6GEYJ331	RES,M330–J–1/10
R2411	ERJ6GEYJ103	RES,M10K–J–1/10	R3218	ERJ6GEYJ471	RES,M470–J–1/10
R2412	ERJ6GEYJ104	RES,M100K–J–1/10	R3220	ERJ6GEYJ331	RES,M330–J–1/10
R2415	ERJ6GEYJ473	RES,M47K–J–1/10	R3221	ERJ6GEYJ122	RES,M1.2K–J–1/10
R2416	ERJ6GEYJ104	RES,M100K–J–1/10	R3222	ERJ6GEYJ471	RES,M470–J–1/10
R3001	ERJ6GEYJ473	RES,M47K–J–1/10	R3223	ERJ6GEYJ471	RES,M470–J–1/10
R3002	ERJ6GEYJ104	RES,M100K–J–1/10	R3224	ERJ6GEYJ471	RES,M470–J–1/10
R3003	ERJ6GEYJ104	RES,M100K–J–1/10	R3229	ERJ6GEYJ152	RES,M1.5K–J–1/10
R3011	ERJ6GEYJ680	RES,M68–J–1/10	R4310	ERJ6GEYJ103	RES,M10K–J–1/10
R3012	ERJ6GEYJ750	RES,M75–J–1/10	R4311	ERJ6GEYJ103	RES,M10K–J–1/10
R3013	ERJ6GEYJ184	RES,M180K–J–1/10	R4326	ERJ6GEYJ471	RES,M470–J–1/10
R3014	ERJ6GEYJ184	RES,M180K–J–1/10	R4327	ERJ6GEYJ331	RES,M330–J–1/10
R3015	ERJ6GEYJ750	RES,M75–J–1/10	R4328	ERJ6GEYJ560	RES,M56–J–1/10
R3016	ERJ6GEYJ184	RES,M180K–J–1/10	R4329	ERJ6GEYJ182	RES,M1.8K–J–1/10
R3017	ERJ6GEYJ750	RES,M75–J–1/10	R4330	ERJ6GEYJ561	RES,M560–J–1/10
R3019	ERJ6GEYJ184	RES,M180K–J–1/10	R4331	ERJ6GEYJ471	RES,M470–J–1/10
R3021	ERJ6GEYJ102	RES,M1K–J–1/10	R4332	ERJ6GEYJ393	RES,M39K–J–1/10
R3022	ERJ6GEYJ101	RES,M100–J–1/10	R4333	ERJ6GEYJ304	RES,M300K–J–1/10
R3024	ERJ6GEYJ390	RES,M39–J–1/10	R4334	ERJ6GEYJ152	RES,M1.5K–J–1/10
R3025	ERJ6GEYJ683	RES,M68K–J–1/10	R4336	ERJ6GEYJ680	RES,M68–J–1/10
R3026	ERJ6GEYJ101	RES,M100–J–1/10	R4338	ERJ6GEYJ222	RES,M2.2K–J–1/10
R3028	ERJ6GEYJ102	RES,M1K–J–1/10	R4339	ERJ6GEYJ102	RES,M1K–J–1/10
R3031	ERJ6GEYJ101	RES,M100–J–1/10	R4340	ERJ6GEYJ471	RES,M470–J–1/10
R3032	ERJ6GEYJ102	RES,M1K–J–1/10	R4341	ERJ6GEYJ222	RES,M2.2K–J–1/10
R3034	ERJ6GEYJ683	RES,M68K–J–1/10	R4342	ERJ6GEYJ223	RES,M22K–J–1/10

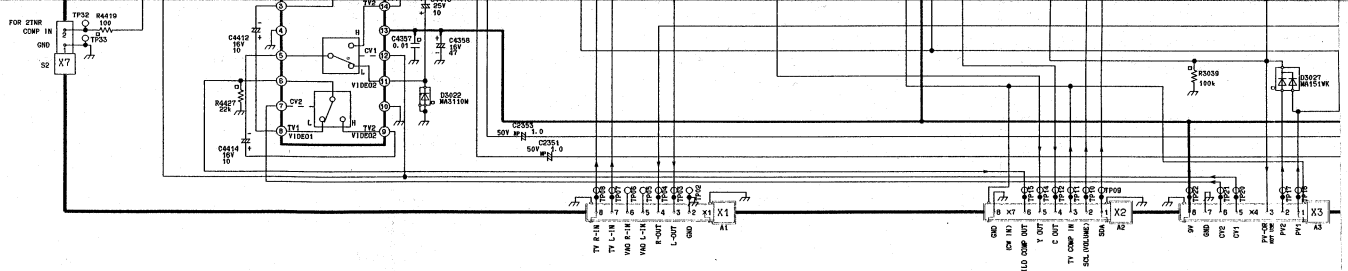
PARTS LIST

A B C D

1 2 3

X-Board Schematic
CT-36G32V/UV





Board Index

"A"–Board – Main Chassis
"C"–Board – CRT Board
"GM"–Board – Remote Sensor
"S"–Board – 2nd Tuner
"X"–Board – Input Jacks, Comb Filter
"Y"–Board – PIP Processor
"Z"–Board – Parabolic Correction

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SP
FEATURES THAT ARE IMPORTANT FOR PROTECTION
X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZ
WHEN SERVICING IT IS ESSENTIAL THAT
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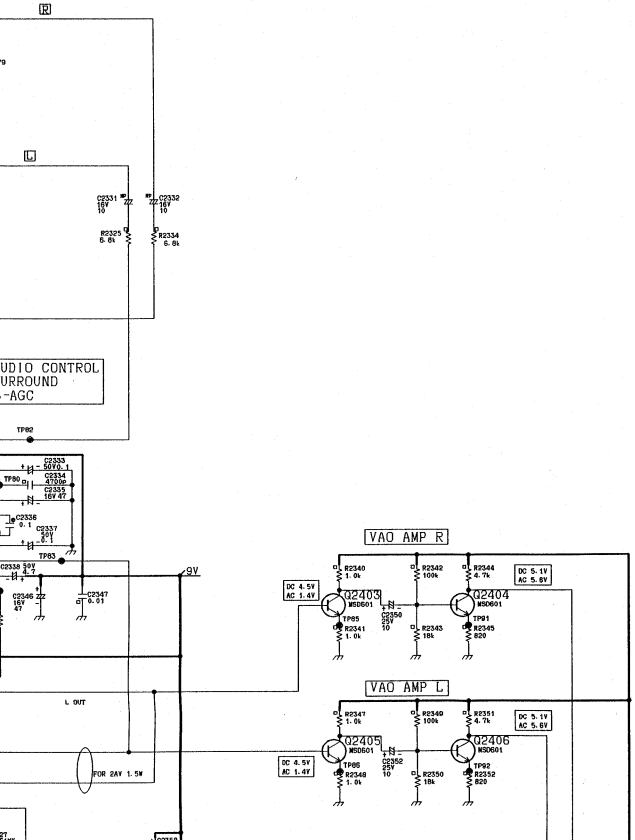
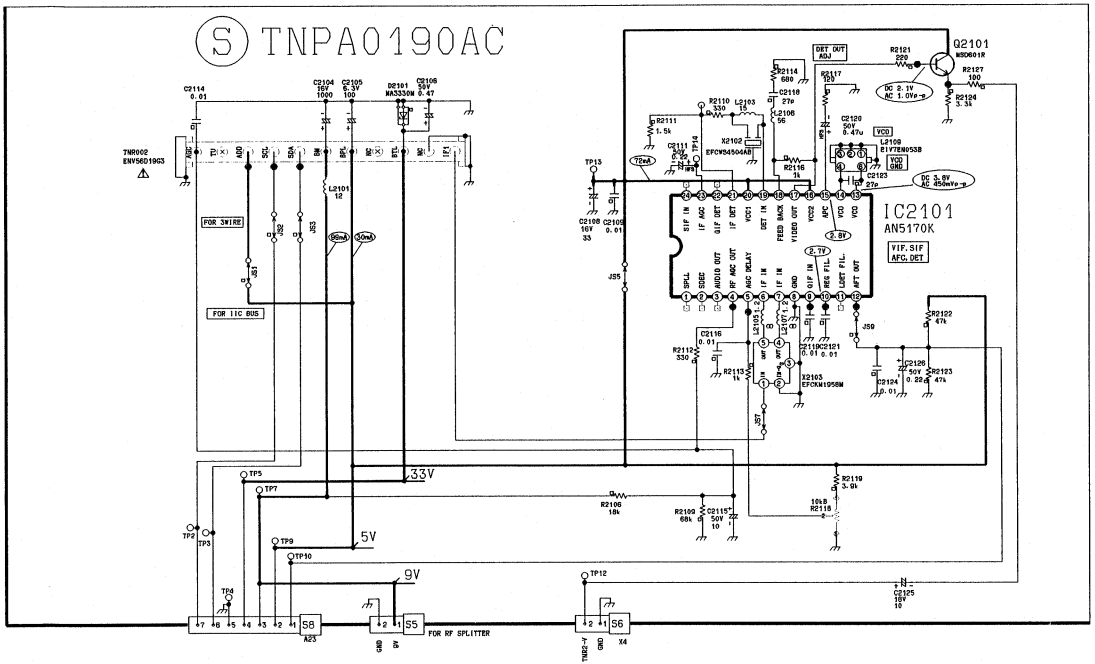
CRITICAL COMPONENTS DESIGNATED WITH A ⚠ I
SCHEMATIC.

TNP2AA007AE

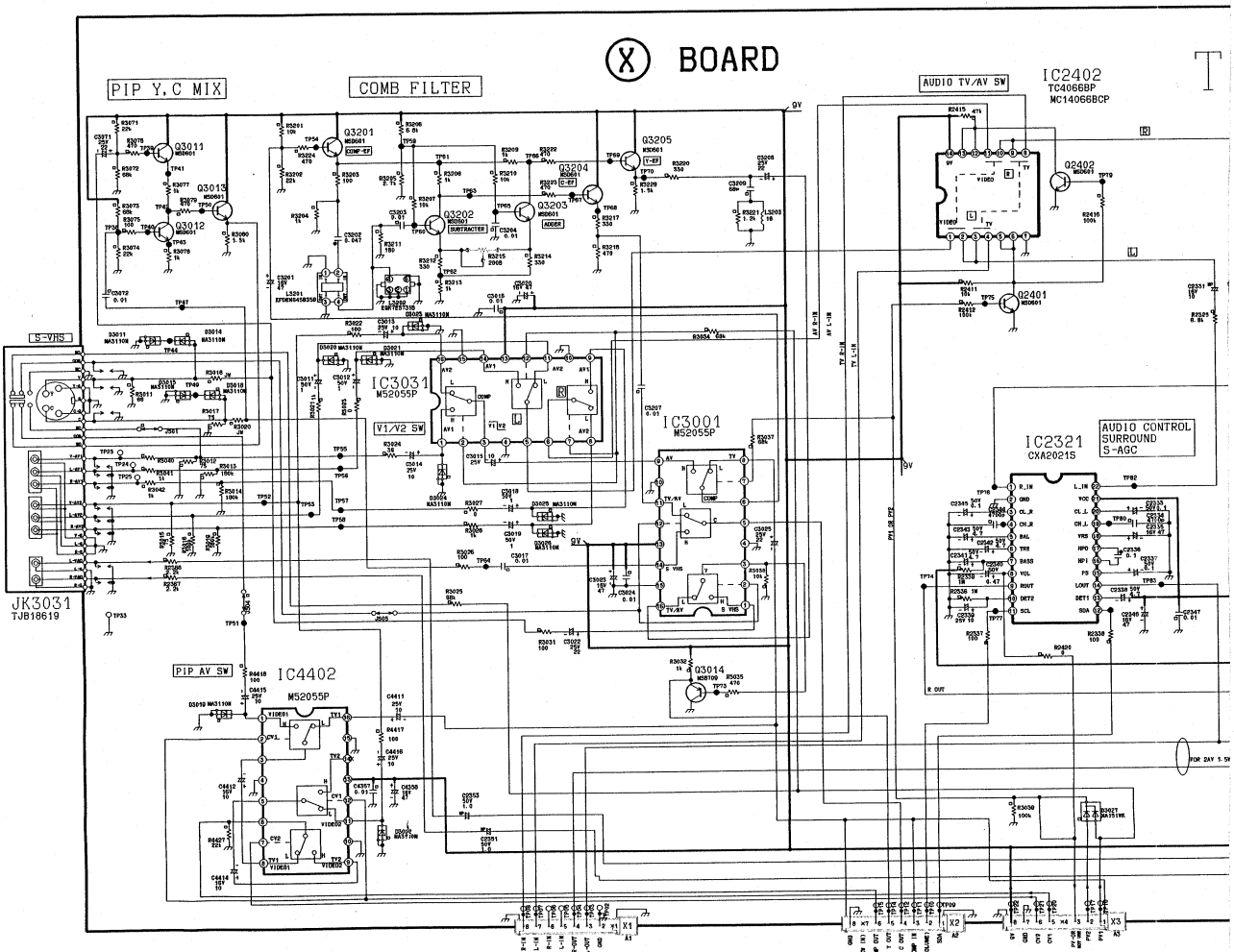


S-Board Schematic
CT-36G32V/UV

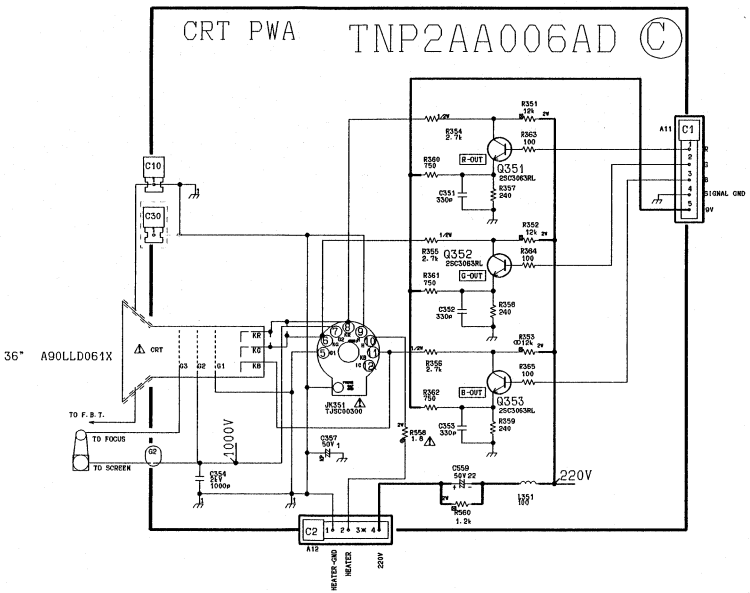


A2 B C D

X-Board Schematic
CT-36G22V/UV/CV



C-Board Schematic



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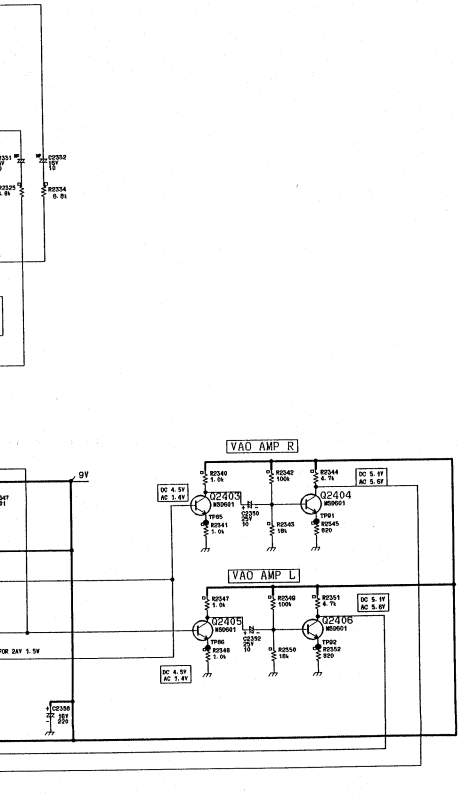
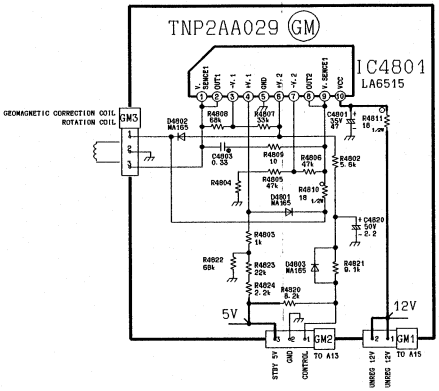
- **"S"-Board** – 2nd Tuner
- **"X"-Board** – Input Jacks, Comb Filter
- **"Y"-Board** – PIP Processor
- **"Z"-Board** – Parabolic Correction

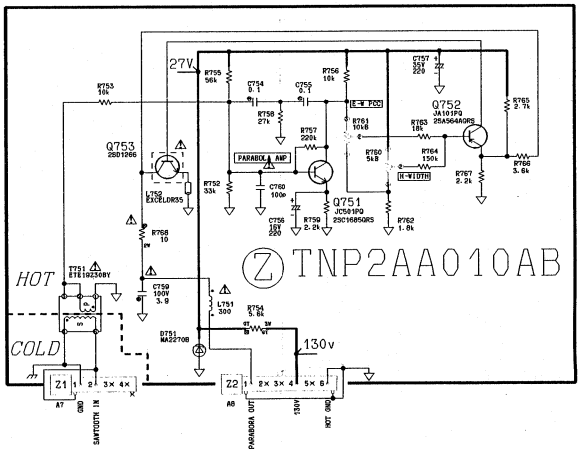
TNP2AA007AF



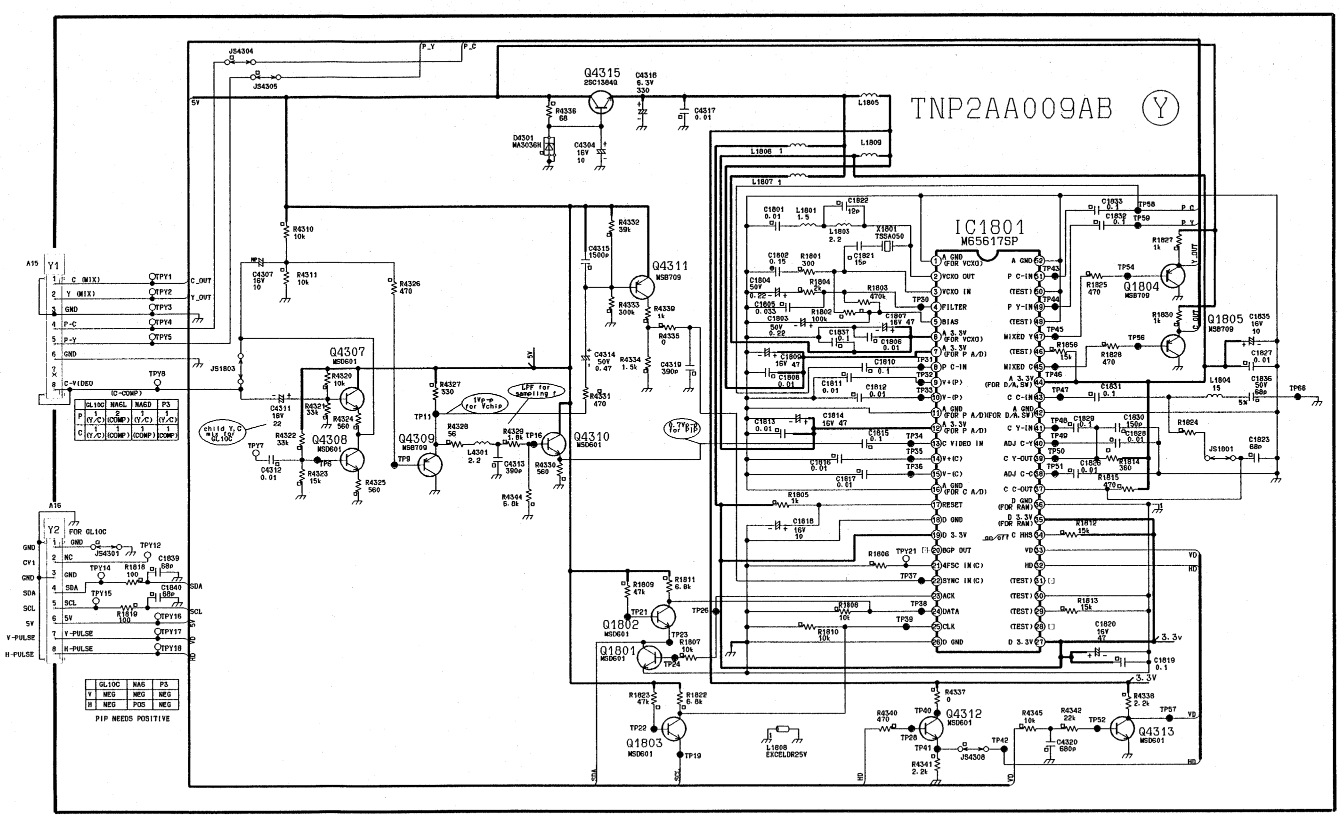
GM-Board Schematic



Z-Board Schematic



Y-Board Schematic



TNP2AA009AB
Y
IC1801
M65617SP
Q4315
2SC1384Q
Q4311
MSB709
Q4307
MSD601
Q4308
MSD601
Q4309
MSB709
Q4310
MSD601
Q1804
MSB709
Q1805
MSB709
Q1802
MSD601
Q1801
MSD601
Q1803
MSD601
Q4312
MSD601
Q4313
MSD601
Y1
A15
C (MIX)
Y (MIX)
GND
P-C
P-Y
C-VIDEO
C_OUT
Y_OUT
P_Y
P_C
Y2
A16
FOR GL10C
NC
SDA
SCL
5V
V-PULSE
H-PULSE
child Y,C mix for GL10C
1Vp-p for Vchip
LPF for sampling f
0.7Vp-p for PIP
L1808
EXCELDR25V

	GL10C	NA6L	NA6D	P3
P	1 (Y/C)	2 (COMP)	1 (Y/C)	1 (Y/C)
C	1 (Y/C)	1 (COMP)	1 (COMP)	1 (COMP)

	GL10C	NA6	P3
V	NEG	NEG	NEG
H	NEG	POS	NEG

PIP NEEDS POSITIVE

A | B | C | D

1

2

3

Voltage Measurements "A"–Board

IC001			
01	5.10	33	0.00
02	2.18	34	5.09
03	3.22	35	5.13
04	3.39	36	0.00
05	5.12	37	0.00
06	2.16	38	0.00
07	0.00	39	0.17
08	0.00	40	4.31
09	0.00	41	0.00
10	5.12	42	0.00
11	1.28	43	0.00
12	0.00	44	0.00
13	2.57	45	0.00
14	0.00	46	0.00
15	0.00	47	0.07
16	0.00	48	0.06
17	0.00	49	0.06
18	5.40	50	0.06
19	0.00	51	3.26
20	1.67	52	0.06
21	0.00	53	0.06
22	5.13	54	5.25
23	0.14	55	4.04
24	1.42	56	0.00
25	1.27	57	5.12
26	1.75	58	5.13
27	0.00	59	3.33
28	0.00	60	3.37
29	0.00	61	5.13
30	0.00	62	2.40
31	5.07	63	2.14
32	0.00	64	0.00

IC101			
01	2.91	27	4.27
02	5.60	28	3.01
03	0.00	29	2.67
04	0.00	30	2.95
05	0.00	31	4.48
06	0.00	32	2.01
07	6.79	33	2.73
08	3.37	34	2.56
09	3.35	35	3.38
10	3.33	36	3.38
11	4.22	37	8.79
12	0.00	38	3.91
13	3.62	39	4.20
14	3.33	40	2.83
15	3.37	41	4.20
16	0.29	42	4.92
17	3.29	43	2.52
18	4.92	44	0.00
19	2.73	45	0.79
20	2.73	46	6.16
21	0.00	47	4.18
22	2.47	48	2.23
23	4.99	49	5.16
24	4.02	50	0.89
25	1.81	51	6.31
26	5.63	52	4.05

IC002	
01	0.00
02	0.00
03	0.00
04	0.00
05	3.33
06	3.37
07	0.00
08	5.13

IC003	
01	5.11
02	0.00
03	5.12

IC451	
01	8.68
02	4.05
03	4.35
04	4.39
05	0.00
06	4.26
07	4.04
08	27.19
09	2.49
10	1.37
11	0.00
12	16.63
13	27.90

IC551	
01	12.64
02	0.00
03	8.83

IC552	
01	8.33
02	0.00
03	4.93

IC801	
01	0.83
02	0.06
03	0.00
04	11.91

IC803	
01	88.10
02	131.00
03	262.20
04	130.70
05	131.90

Voltage Measurements "A"–Board

IC2201			
01	0.00	15	3.72
02	3.33	16	4.43
03	3.37	17	4.49
04	2.67	18	4.43
05	0.09	19	0.73
06	5.69	20	4.25
07	2.73	21	0.00
08	8.83	22	4.49
09	4.39	23	0.71
10	4.45	24	4.22

IC2301	
01	1.25
02	0.00
03	18.30
04	0.00
05	0.00
06	1.24
07	9.83
08	17.48
09	0.00
10	18.57

Voltage Measurements "GM"–Boa

IC4801	
01	5.66
02	5.66
03	3.75
04	3.77
05	0.00
06	2.87
07	2.85
08	5.74
09	5.74
10	12.44

Voltage Measurements "S"–Boar

IC2101			
01	3.21	13	2.06
02	2.69	14	2.43
03	1.20	15	2.20
04	2.59	16	1.92
05	0.00	17	4.90
06	2.60	18	1.92
07	2.61	19	2.02
08	2.43	20	2.00
09	2.49	21	4.90
10	2.53	22	2.74
11	2.10	23	3.56
12	2.12	24	3.55

B	Q2101
C	2.00
E	4.90
	1.43

Voltage Measurements "X"–Boar

08	8.83
09	4.39
10	4.45
11	4.49
12	4.33
13	3.08
14	4.44

22	4.49
23	0.71
24	4.22
25	4.47
26	4.38
27	5.68
28	5.97

08	17.48
09	0.00
10	18.57
11	17.49
12	9.72

	Q001	Q002	Q003	Q004	Q302	Q303	Q304
B	0.74	5.83	4.95	5.10	2.93	1.12	2.73
C	0.09	10.44	5.80	0.00	8.79	0.00	8.79
E	0.00	5.13	5.83	5.09	2.34	1.81	2.12

	Q305	Q306	Q307	Q451	Q452	Q501	Q551
B	1.64	6.50	2.15	0.60	0.00	0.00	0.00
C	6.50	2.13	0.00	0.00	3.61	97.30	137.80
E	1.03	7.10	2.81	0.00	0.00	0.00	-0.08

	Q801	Q802	Q804	Q2302	Q2303	Q2305	Q3001
B	130.20	130.10	130.60	18.28	0.07	5.84	0.00
C	131.70	131.00	0.84	0.00	18.31	0.00	8.75
E	130.60	131.00	131.10	18.31	0.00	3.26	0.00

Voltage Measurements "C"-Board

	Q351	Q352	Q353
B	3.38	3.34	3.34
C	152.70	157.20	156.10
E	3.24	3.11	3.12

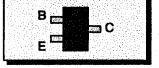
Voltage Measurements "X"-Boar

IC2321	
01	4.31
02	0.00
03	4.36
04	4.35
05	4.34
06	4.30
07	4.39
08	3.25
09	4.32
10	2.03
11	3.36
12	3.31
13	1.59
14	4.32
15	4.31
16	3.74
17	4.32
18	4.32
19	4.34
20	4.36
21	8.76
22	4.36

IC2402	
01	3.13
02	3.76
03	3.60
04	3.52
05	8.01
06	8.01
07	0.00
08	3.91
09	3.52
10	3.40
11	3.11
12	0.00
13	0.00
14	8.76

IC3001	
01	4.54
02	0.00
03	3.10
04	0.00
05	3.13
06	3.12
07	0.10
08	4.54
09	4.54
10	0.00
11	4.54
12	0.00
13	8.76
14	4.54
15	0.60
16	4.54

CHIP TRANSISTOR LEAD DESIGNATION



	Q2401	Q2402	Q2403	Q2404	Q2405	Q2406	Q30
B	0.06	0.61	4.32	4.36	4.32	1.31	6.
C	8.00	0.00	5.07	8.76	5.06	4.64	8.
E	0.00	0.00	3.67	3.72	3.67	0.69	5.

	Q3013	Q3014	Q3201	Q3202	Q3203	Q3204	Q32
B	4.41	3.11	5.84	2.46	2.47	4.36	4.
C	8.75	0.00	8.76	4.37	4.38	8.76	8.
E	3.81	3.78	5.19	1.86	1.86	3.72	3.

4

5
3A

Voltage Measurements "Y"-Board

IC1801			
01	0.00	27	3.32
02	1.59	28	3.31
03	1.62	29	0.00
04	1.65	30	0.00
05	1.64	31	0.00
06	3.32	32	0.58
07	3.32	33	0.10
08	1.00	34	3.31
09	1.52	35	3.32
10	0.50	36	0.00
11	0.00	37	2.53
12	3.32	38	1.28
13	0.87	39	2.94
14	1.53	40	1.17
15	0.49	41	1.01
16	0.00	42	0.00
17	3.32	43	1.00
18	0.00	44	3.32
19	3.32	45	1.01
20	0.00	46	3.31
21	0.00	47	0.98
22	0.24	48	0.00
23	0.00	49	0.96
24	2.63	50	0.00
25	2.72	51	1.00
26	0.00	52	0.00

	Q1801	Q1802	Q1803	Q1804	Q1805	Q4309
B	0.00	3.18	3.27	0.96	1.02	0.97
C	3.33	2.63	2.73	0.00	0.00	0.00
E	0.00	3.33	3.36	1.63	1.69	1.64

	Q4310	Q4311	Q4312	Q4313	Q4315
B	2.51	4.56	0.12	0.64	4.02
C	4.89	0.40	3.32	0.11	4.89
E	1.87	4.89	0.59	0.00	3.32

Note: Stereo Models

The Functions listed below are activated by a DC voltage change to DAC Inputs(Pin 5 and 6) of MPU IC001. Press and hold a function button on the Receiver to measure voltages.

FUNCTION	PIN 5	PIN 6
POWER	0V~0.443V	N/A
VOL ◀	0.797V~1.07V	N/A
VOL ▶	1.424V~1.696V	N/A
CH ▼	2.05V~2.323V	N/A
CH ▲	2.677V~2.95V	N/A
TV/VIDEO	3.304V~3.576V	N/A
ACTION	N/A	0V~0.443V
SHUT DOWN	N/A	3.930V~5.000V

The AUDIO MODES being broadcast are displayed on screen in red by the voltage change to DAC input (Pin 11) of MPU IC001.

AUDIO MODE BROADCAST	PIN 11 MN1873265T7G
MONO	4.0V~5.0V
SAP	2.2V~3.8V
STEREO	0.9V~1.9V
STEREO & SAP	0V~0.6V

CHIP TRANSISTOR LEAD DESIGNATION

Voltage Measurements "Z"-Board

	Q751	Q752	Q753
B	3.69	11.05	0.60
C	11.40	0.60	10.22
E	3.10	11.65	0.00

Tuner Voltage Chart

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.

ard

IC3031	
1	4.56
2	0.23
3	3.13
4	0.00
5	3.13
6	3.12
7	0.22
8	4.54
9	4.54
0	0.00
1	4.54
2	0.22
3	8.77
4	4.55
5	0.00
6	4.55

IC4402	
1	4.55
2	0.04
3	3.13
4	0.00
5	3.13
6	3.12
7	0.04
8	4.54
9	4.54
0	0.00
1	4.54
2	0.44
3	8.76
4	4.54
5	0.00
6	4.55

Q3011	Q3012
6.50	2.05
8.75	4.44
5.89	1.43

Q3205
4.38
8.76
3.75

Waveform Measurements

1. ③ indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with a NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak amplitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.
   CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

The waveforms are taken in the order of circuit flow through the various sections as follows:

VIDEO – Waveforms 1–3
COLOR – Waveforms 4–8
VERTICAL – Waveforms 9–13
HORIZONTAL – Waveforms 14–17
CRT DRIVE – Waveforms 18–20
POWER SUPPLY – Waveforms 21–22

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in μH.
4. Test point indicated by ⏚; Test point but no pin ⚲.
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. — **(BOLD LINE)** Indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION;** ⏚ indicates COLD GROUND.
   NOTE: All other component symbols are used for engineering design purposes.

Voltage Measurements

1. Voltage measurement:
   - AC input to the Receiver is 120V, NTSC generator is connected to the antenna of the Receiver. (Color bar pattern of 100IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE – (Set–Up Menu) in TV/ANT Mode
     Volume – Min
     TV/Video SW – TV position
     Audio Mode – Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are all nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter.
   Caution: Incorrect ground connection will result in erroneous readings.

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.

NOTE: Voltage at the 30V test pin varies with channel selection. Refer to chart for sample tuning voltages of TV/CATV(CABLE) channels as shown.

Voltage Reading Are Nominal And May Vary ± 15%

– VHF –	
Ch. 02	4.0V
Ch. 06	8.2V
Ch. 07	7.0V
Ch. 13	9.3V

– UHF –	
Ch. 14	7.7V
Ch. 69	24V

– CABLE –					
1st Band		2nd Band		3rd Band	
Ch. 1	6.7V	Ch. 16	4.5V	Ch. 47	3.7V
Ch. 15	24.7V	Ch. 46	2.70V	Ch. 94	14.9V
Ch. 95	9.8V			Ch. 100	15.1V
Ch. 99	17.5V			Ch. 125	24.0V

MICROPROCESSOR PROGRAMMING FOR BAND TUNING/SWITCHING

	54MHz ◄► 130MHz	130MHz ◄► 360MHz	360MHz ◄► 806MHz
	FIRST TUNING BAND	SECOND TUNING BAND	THIRD TUNING BAND
VHF	02–06	07–13	
UHF			14–69
CABLE	01–06,14,15,95–99	07–13, 16–46	47–94, 100–125

NOTE: CABLE channel numbers as recommended by the joint EIA/NCTA Engineering Committee and published as EIA INTERIM STANDARD NO. 6 – CABLE TELEVISION CHANNEL IDENTIFICATION PLAN – MAY 1983.

A B C D

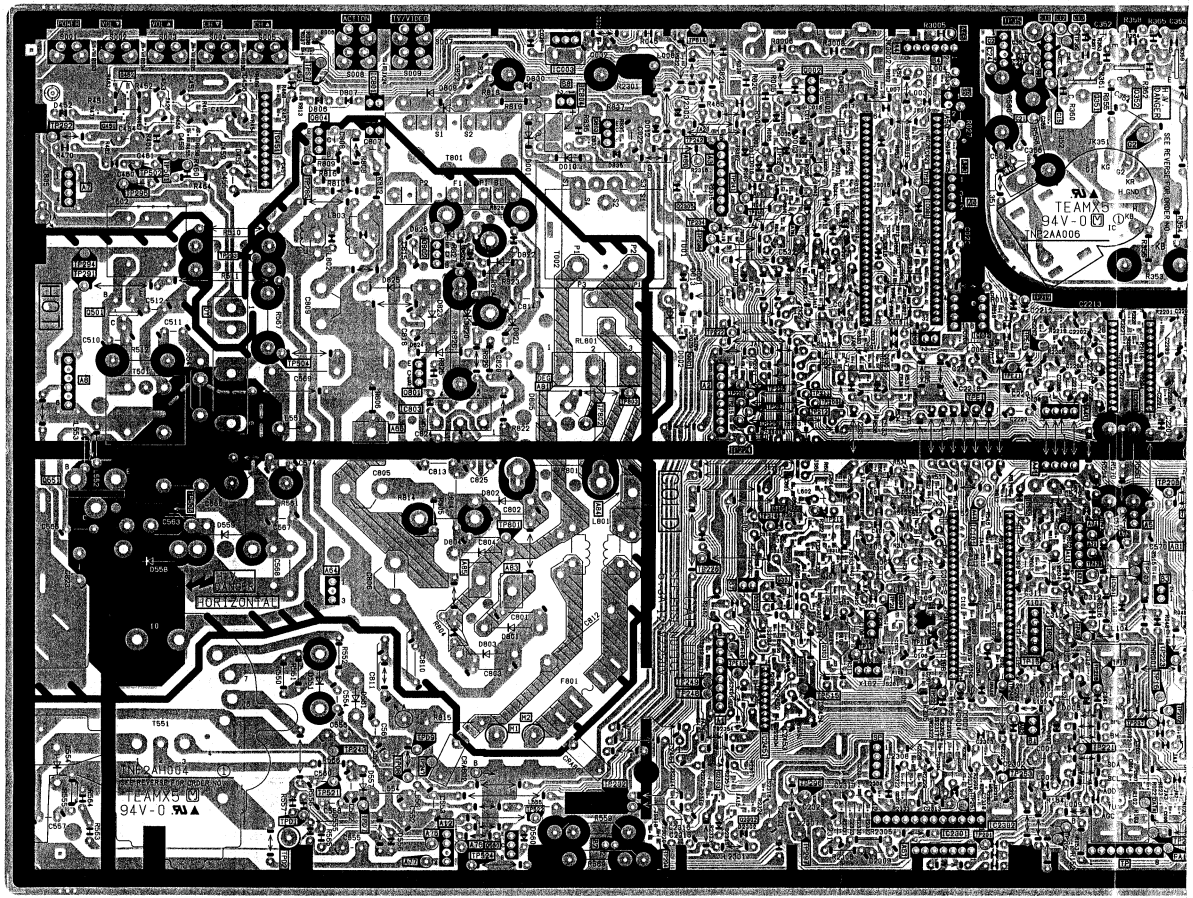
1

2

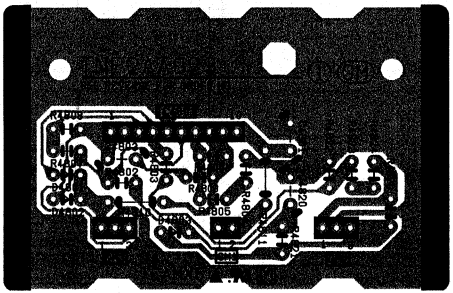
3

A-Board TNP2AH004

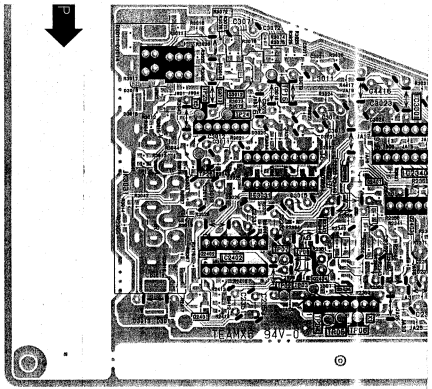
C-Board TNP2AA00



GM-Board TNP2AA029

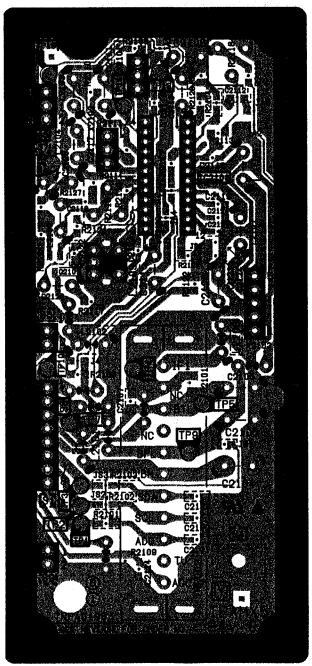


X-Boar

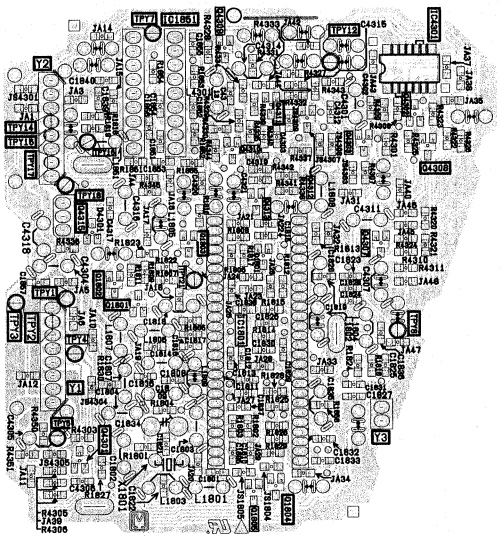


A006

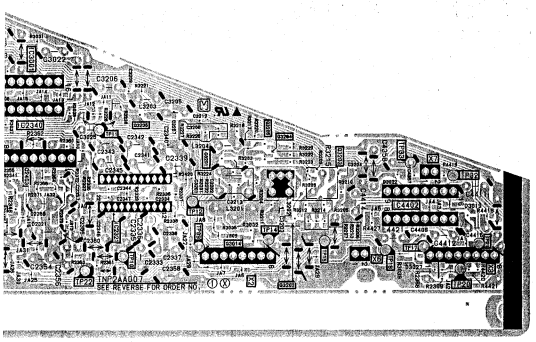
S-Board TNPA0190



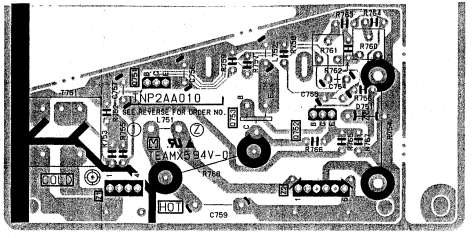
Y-Board TNP2AA009



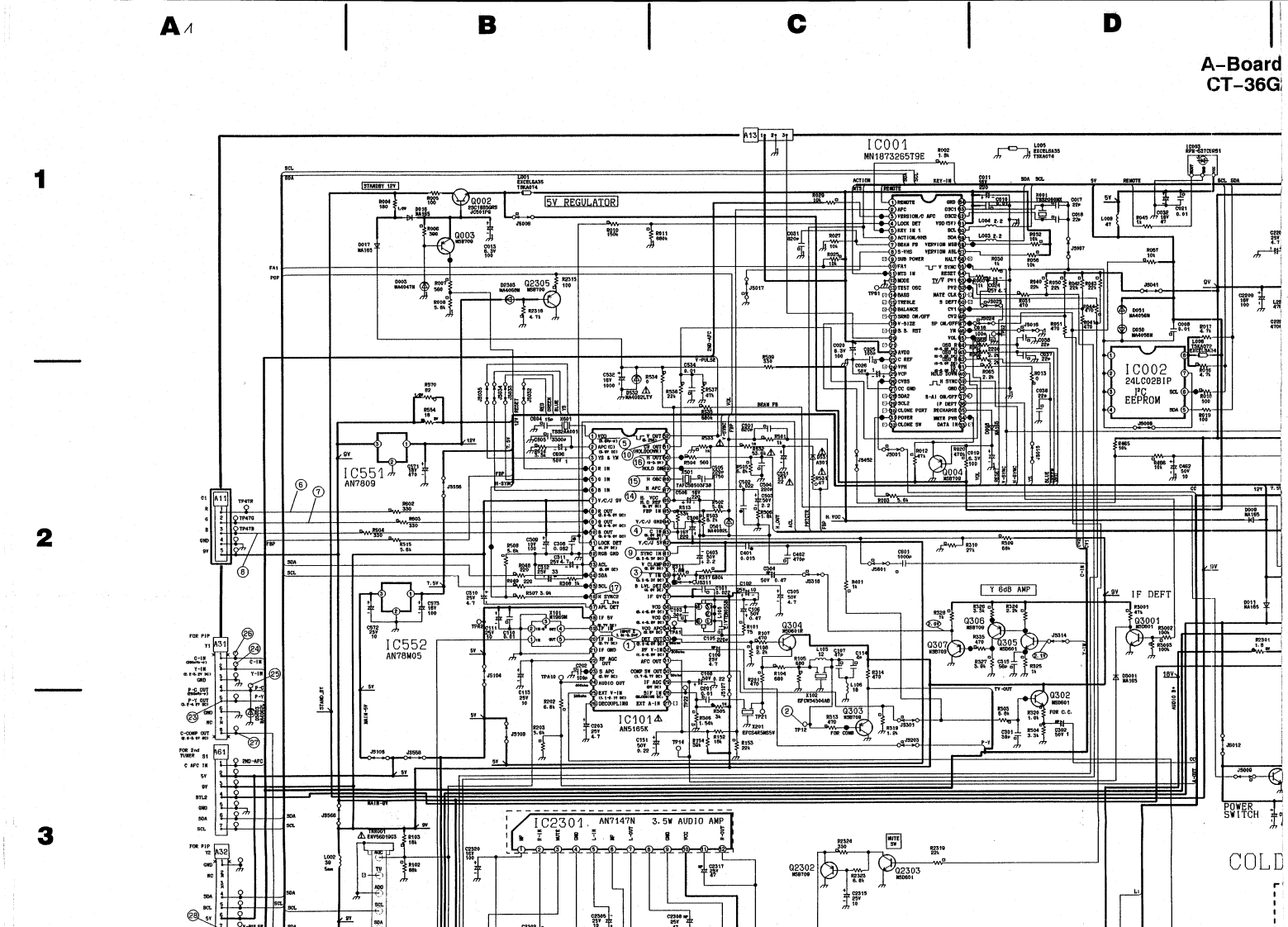
3oard TNP2AA007

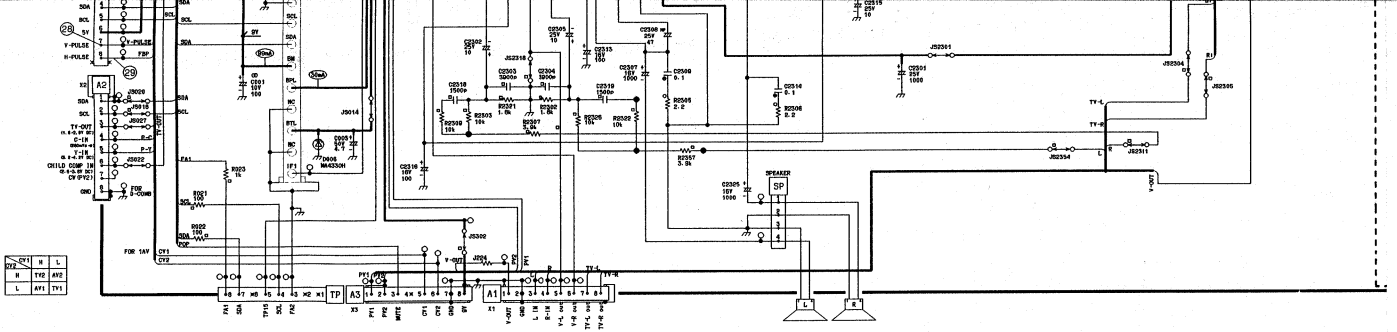


Z-Board TNP2AA010



A-Board
CT-36G





Waveform Measurements

1. (3) indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with a NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
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POWER SUPPLY – Waveforms 21–22
PIP – Waveforms 23–29

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in μH.
4. Test point indicated by ●; Test point but no pin ○.
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
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7. The schematic diagrams are current at the time of printing and are subject to change without notice.
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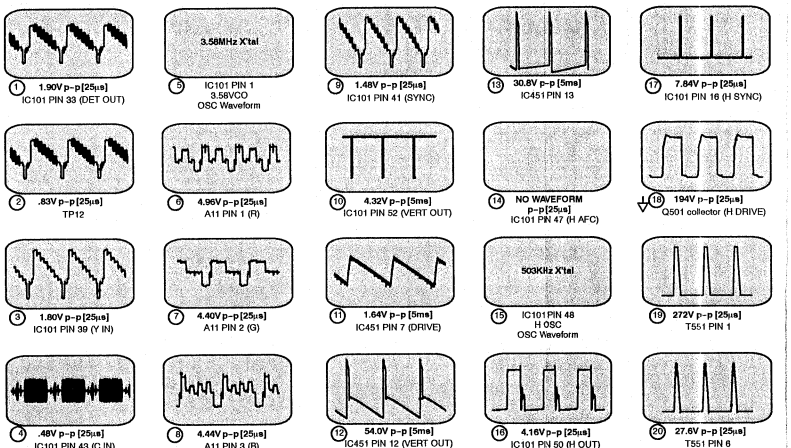
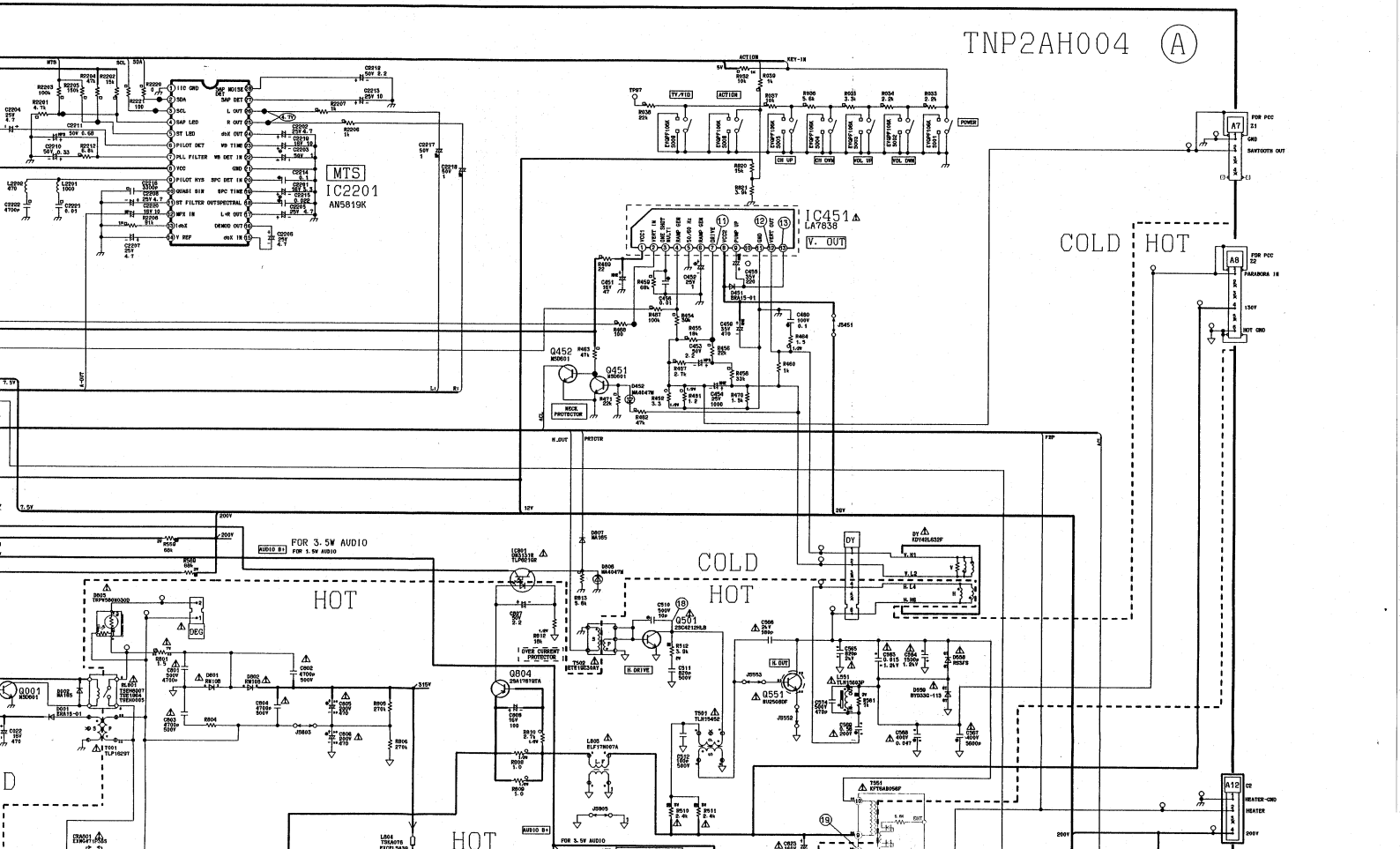
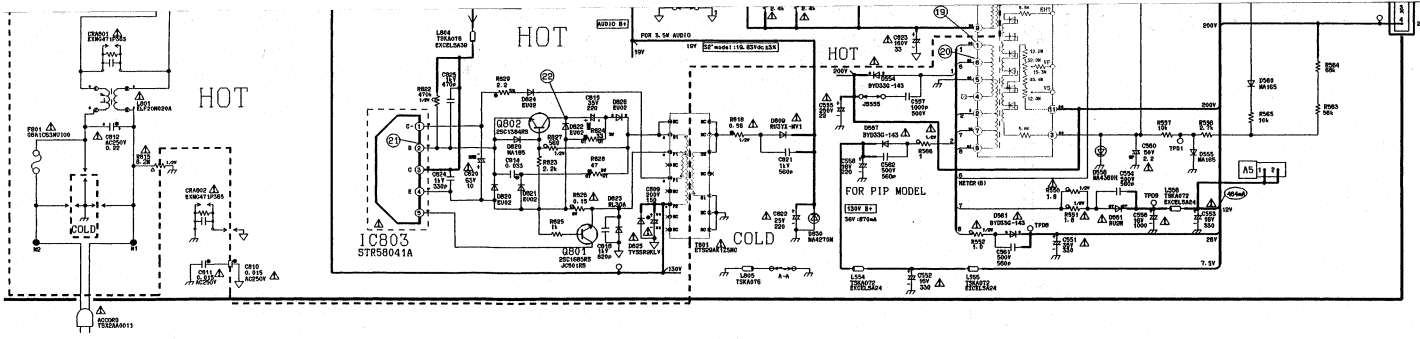
   NOTE: All other component symbols are used for engineering design purposes.

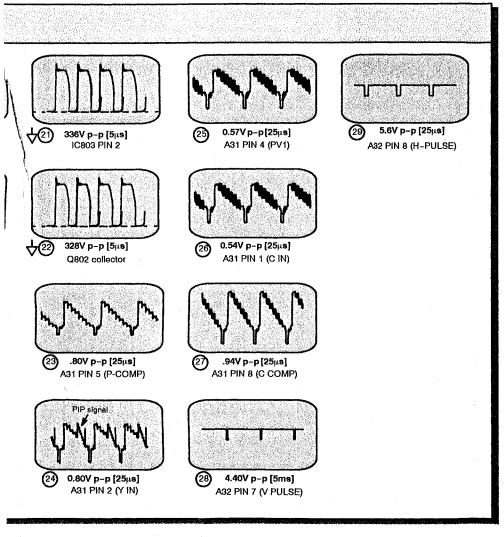
Waveforms – A-Board


1 1.90V p-p [25μs] IC101 PIN 33 (DET OUT)
5 3.58MHz X'tal IC101 PIN 1 3.58VCO OSC Waveform
9 1.48V p-p [25μs] IC101 PIN 41 (SYNC)
13 30.8V p-p [5ms] IC451 PIN 13
17 7.84V p-p [25μs] IC101 PIN 16 (H SYNC)
2 .83V p-p [25μs] TP12
6 4.96V p-p [25μs] A11 PIN 1 (R)
10 4.32V p-p [5ms] IC101 PIN 52 (VERT OUT)
14 NO WAVEFORM p-p [25μs] IC101 PIN 47 (H AFC)
18 194V p-p [25μs] Q501 collector (H DRIVE)
3 1.80V p-p [25μs] IC101 PIN 39 (Y IN)
7 4.40V p-p [25μs] A11 PIN 2 (G)
11 1.64V p-p [5ms] IC451 PIN 7 (DRIVE)
15 503KHz X'tal IC101 PIN 48 H OSC OSC Waveform
19 272V p-p [25μs] T551 PIN 1
4 .48V p-p [25μs] IC101 PIN 43 (C IN)
8 4.44V p-p [25μs] A11 PIN 3 (B)
12 54.0V p-p [5ms] IC451 PIN 12 (VERT OUT)
16 4.16V p-p [25μs] IC101 PIN 50 (H OUT)
20 27.6V p-p [25μs] T551 PIN 6

rd Schematic
G22V/UV/CV







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Board Index

"A"-Board – Main Chassis
"C"-Board – CRT Board
"GM"-Board – Remote Sensor
"S"-Board – 2nd Tuner
"X"-Board – Input Jacks, Comb Filter
"Y"-Board – PIP Processor
"Z"-Board – Parabolic Correction

Note: Stereo Models

The Functions listed below are activated by a DC voltage change to DAC Inputs(Pin 5 and 6) of MPU IC001. Press and hold a function button on the Receiver to measure voltages.

FUNCTION	PIN 5	PIN 6
POWER	0V~0.443V	N/A
VOL ◀	0.797V~1.07V	N/A
VOL ▶	1.424V~1.696V	N/A
CH ▼	2.05V~2.323V	N/A
CH ▲	2.677V~2.95V	N/A
TV/VIDEO	3.304V~3.576V	N/A
ACTION	N/A	0V~0.443V
SHUT DOWN	N/A	3.930V~5.000V

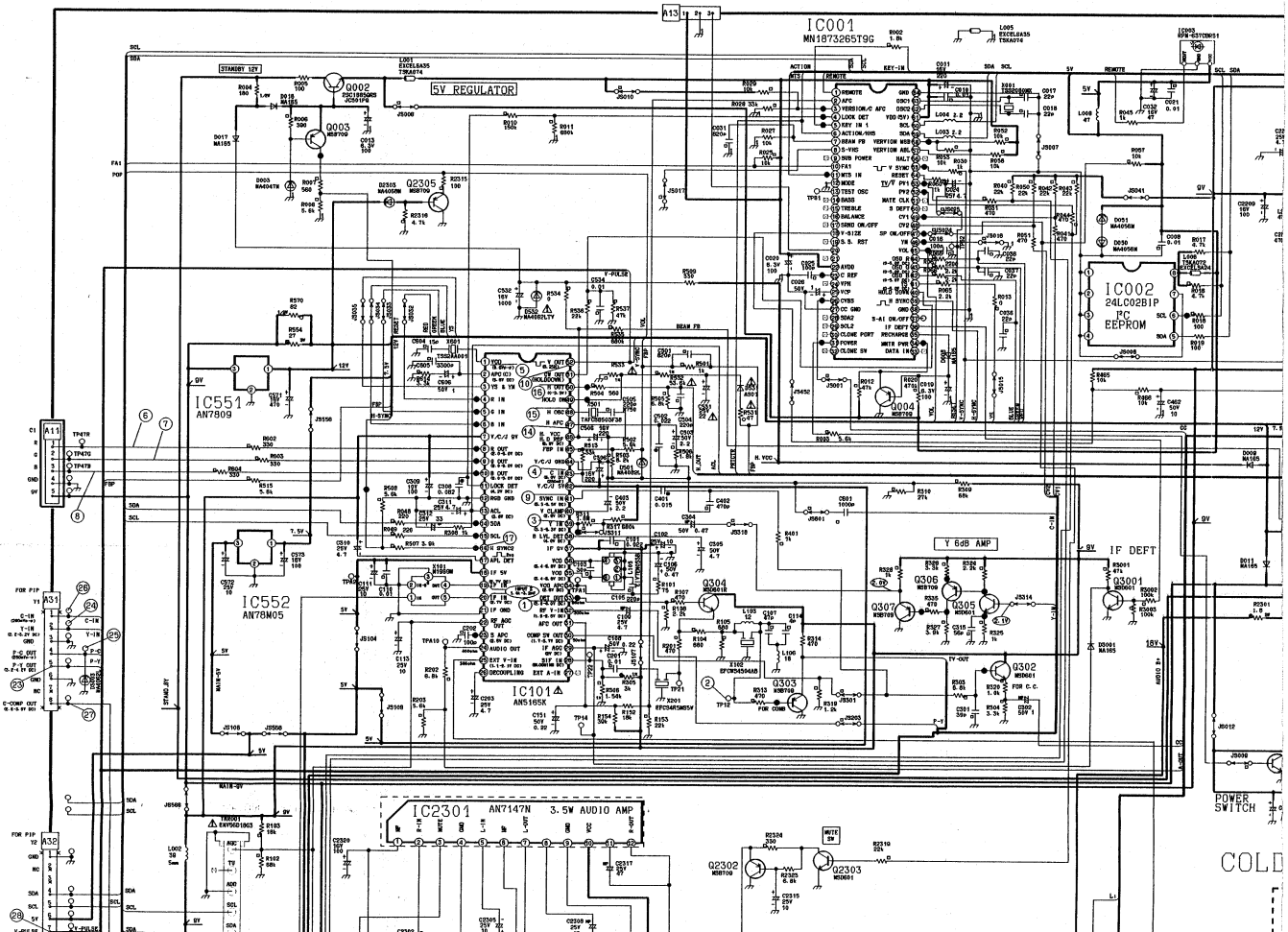
The AUDIO MODES being broadcast are displayed on screen in red by the voltage change to DAC input (Pin 11) of MPU IC001.

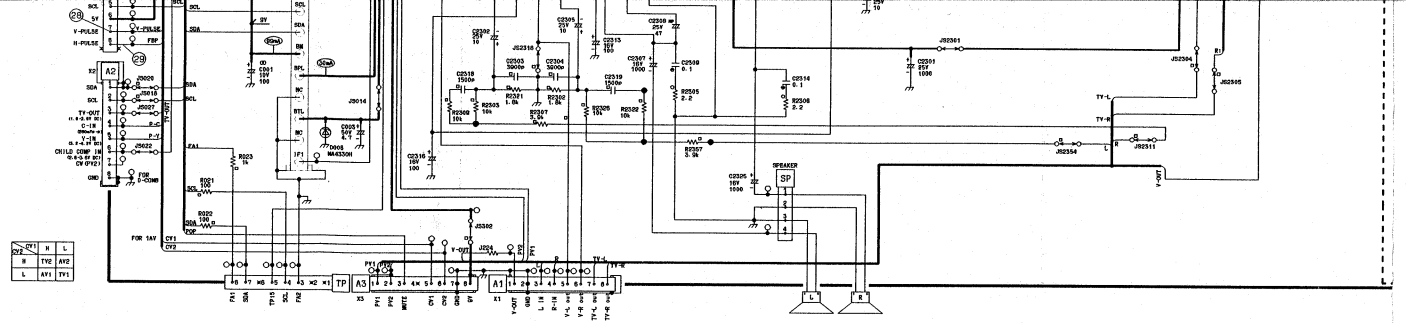
AUDIO MODE BROADCAST	PIN 11
MONO	4.0V~5.0V
SAP	2.2V~3.8V
STEREO	0.9V~1.9V
STEREO & SAP	0V~0.6V

A B C D

1 2 3

A-Board
CT-360





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Schematic Notes

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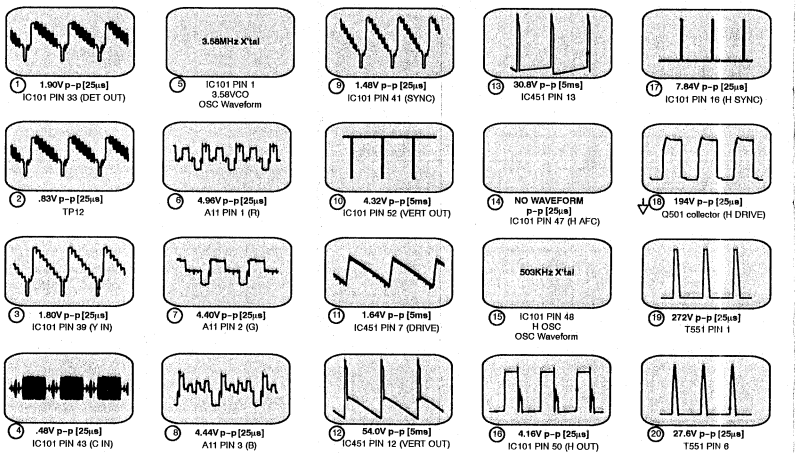
NOTE: All other component symbols are used for engineering design purposes.

Waveforms – A-Board



1. 1.90V p-p [25μs] — IC101 PIN 33 (DET OUT)
2. .83V p-p [25μs] — TP12
3. 1.80V p-p [25μs] — IC101 PIN 39 (Y IN)
4. .48V p-p [25μs] — IC101 PIN 43 (C IN)
5. IC101 PIN 1 3.58VCO OSC Waveform
6. 4.96V p-p [25μs] — A11 PIN 1 (R)
7. 4.40V p-p [25μs] — A11 PIN 2 (G)
8. 4.44V p-p [25μs] — A11 PIN 3 (B)
9. 1.48V p-p [25μs] — IC101 PIN 41 (SYNC)
10. 4.32V p-p [5ms] — IC101 PIN 52 (VERT OUT)
11. 1.64V p-p [5ms] — IC451 PIN 7 (DRIVE)
12. 54.0V p-p [5ms] — IC451 PIN 12 (VERT OUT)
13. 30.8V p-p [5ms] — IC451 PIN 13
14. NO WAVEFORM p-p [25μs] — IC101 PIN 47 (H AFC)
15. IC101 PIN 48 H OSC OSC Waveform
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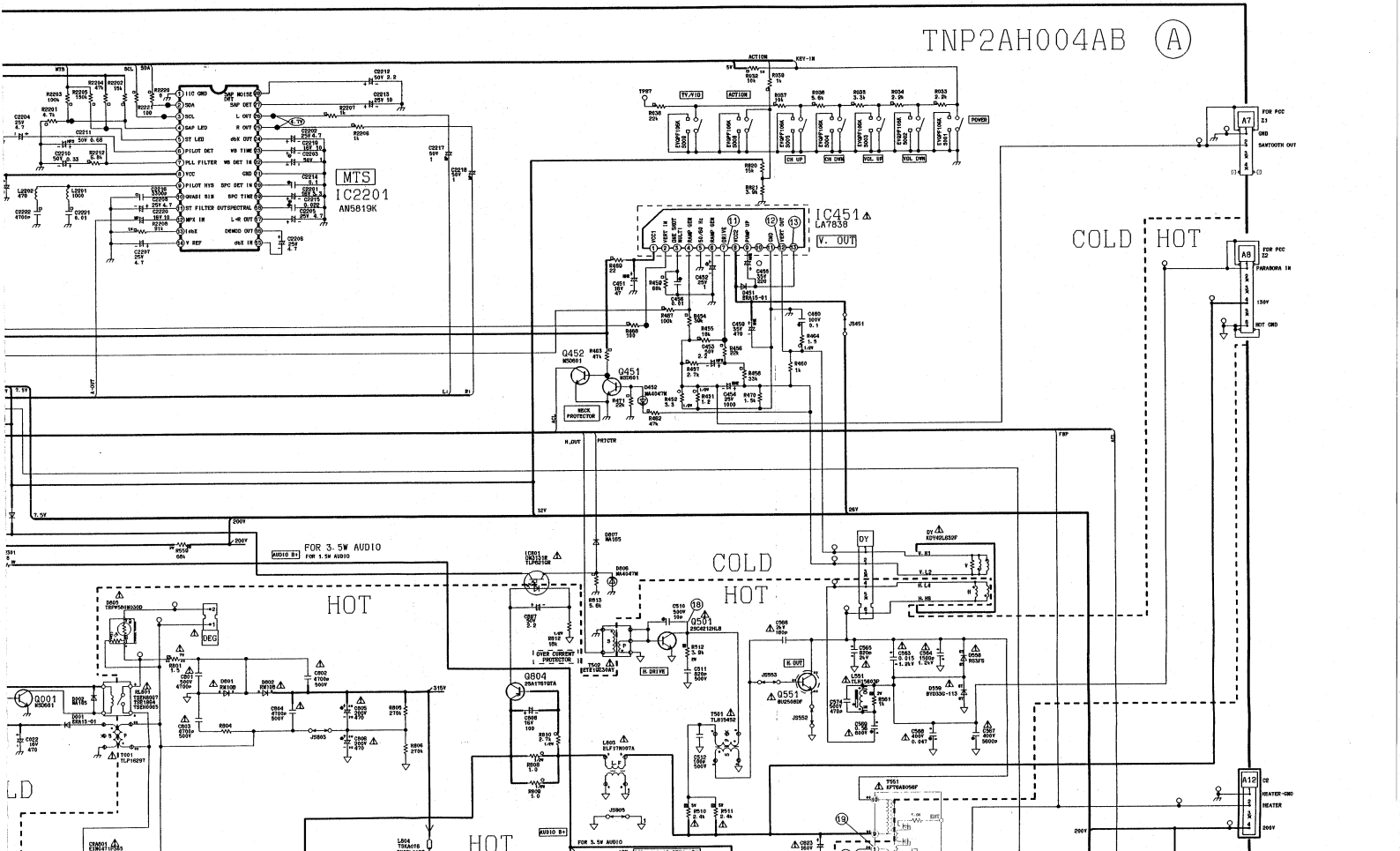
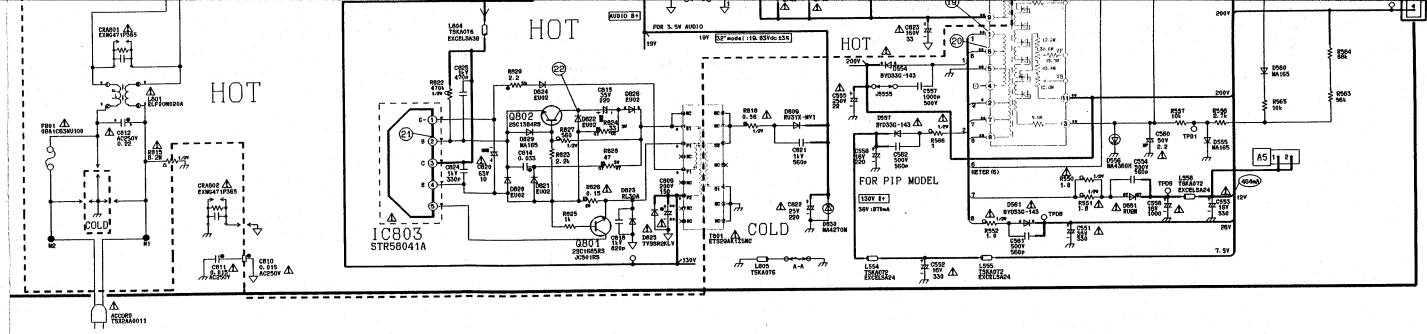
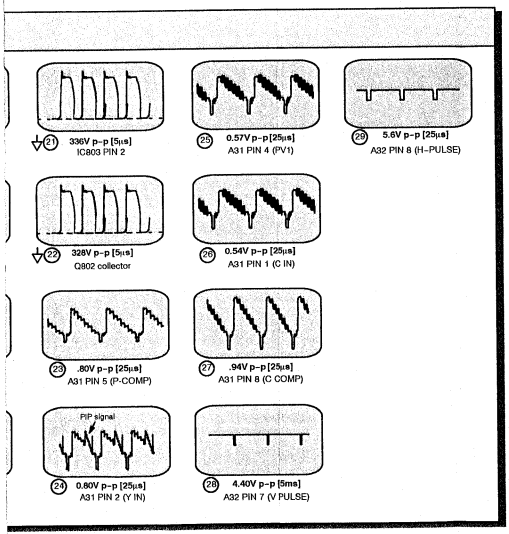
19. 272V p-p [25μs] — T551 PIN 1
20. 27.6V p-p [25μs] — T551 PIN 6

d Schematic
6G32V/UV






21 336V p-p [5µs] IC803 PIN 2
25 0.57V p-p [25µs] A31 PIN 4 (PV1)
26 5.6V p-p [25µs] A32 PIN 8 (H-PULSE)
22 328V p-p [5µs] Q802 collector
26 0.54V p-p [25µs] A31 PIN 1 (C IN)
23 .80V p-p [25µs] A31 PIN 5 (P-COMP)
27 .94V p-p [25µs] A31 PIN 8 (C COMP)
PIP signal
24 0.80V p-p [25µs] A31 PIN 2 (Y IN)
28 4.40V p-p [5ms] A32 PIN 7 (V PULSE)

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The Functions listed below are activated by a DC voltage change to DAC Inputs(Pin 5 and 6) of MPU IC001. Press and hold a function button on the Receiver to measure voltages.

FUNCTION	PIN 5	PIN 6
POWER	0V~0.443V	N/A
VOL ◀	0.797V~1.07V	N/A
VOL ▶	1.424V~1.696V	N/A
CH ▼	2.05V~2.323V	N/A
CH ▲	2.677V~2.95V	N/A
TV/VIDEO	3.304V~3.576V	N/A
ACTION	N/A	0V~0.443V
SHUT DOWN	N/A	3.930V~5.000V

The AUDIO MODES being broadcast are displayed on screen in red by the voltage change to DAC input (Pin 11) of MPU IC001.

AUDIO MODE BROADCAST	PIN 11
MONO	4.0V~5.0V
SAP	2.2V~3.8V
STEREO	0.9V~1.9V
STEREO & SAP	0V~0.6V

REPLACEMENT PARTS LIST

(Models: CT–36G22V, CT–36G22CV, CT–36G22UV, CT–36G32V & CT–36G32UV)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
R4344	ERJ6GEYJ682	RES,M6.8K–J–1/10
R4345	ERJ6GEYJ103	RES,M10K–J–1/10
R4417	ERJ6GEYJ101	RES,M100–J–1/10
R4418	ERJ6GEYJ101	RES,M100–J–1/10
R4419	ERJ6GEYJ101	RES,M100–J–1/10 *CT–36G32V CT–36G32UV*
R4427	ERJ6GEYJ223	RES,M22K–J–1/10
R4802	ERDS2TJ562	RES,C5.6K–J–1/4
R4803	ERDS2TJ102	RES,C1K–J–1/4
R4805	ERDS2TJ473	RES,C47K–J–1/4
R4806	ERDS2TJ473	RES,C47K–J–1/4
R4807	ERDS2TJ333	RES,C33K–J–1/4
R4808	ERDS2TJ683	RES,C68K–J–1/4
R4809	ERDS2TJ100	RES,C10–J–1/4
R4810	ERDS2TJ180	RES,C18–J–1/4
R4811	ERDS1FJ180	RES,C18–J–1/2
R4820	ERDS2TJ822	RES,C8.2K–J–1/4
R4821	ERDS2TJ912	RES,C9.1K–J–1/4
R4822	ERDS2TJ683	RES,C68K–J–1/4
R4823	ERDS2TJ223	RES,C22K–J–1/4
R4824	ERDS2TJ222	RES,C2.2K–J–1/4
		SWITCHES
S001	EVQPF106K	SWITCH
S002	EVQPF106K	SWITCH
S003	EVQPF106K	SWITCH
S004	EVQPF106K	SWITCH
S005	EVQPF106K	SWITCH
S008	EVQPF106K	SWITCH
S009	EVQPF106K	SWITCH
		TRANSFORMERS
T001	**TLP16297**	**TRANSFORMER, POWER SUPPLY**
T501	**TLH15452**	**TRANSFORMER, HORIZONTAL DRIVER**
T502	**ETE19Z30AY**	**TRANSFORMER, HORIZONTAL COUPLING**
T551	**KFT6AB056F**	**TRANSFORMER, FLYBACK**
T751	**ETE19Z30BY**	**TRANSFORMER**
T801	**ETS29AK1Z5NC**	**TRANSFORMER**
		CRYSTALS/FILTERS
X001	TSS2080MX	CRYSTAL, 12 MHZ CLOCK
X101	M1969M	SAW FILTER
X102	EFCWS4504AB	FILTER 4.5MHZ
X201	EFCS4R5MS6W	FILTER 4.5MHZ BANDPASS
X501	TAFCSB503F38	CRYSTAL, CLOCK
X601	TSS2AA001	CRYSTAL, 3.58MHZ
X1801	TSSA050	CRYSTAL OSCILLATOR

REF. NO.	PART NO.	DESCRIPTION
X2102	EFCWS4504AB	FILTER 4.5MHZ *CT–36G32V CT–36G32UV*
X2103	EFCKM1958M	CERAMIC FILTER *CT–36G32V CT–36G32UV*
		OTHERS
M001	**A90LLD061X**	**CRT 36"**
TNR001	**ENV56D18G3**	**TUNER** ***CT–36G22V CT–36G22UV CT–36G22CV***
TNR001	**ENV56D19G3**	**TUNER** ***CT–36G32V CT–36G32UV***
TNR002	**ENV56D19G3**	**TUNER** ***CT–36G32V CT–36G32UV***
M002	ENPE625A	ANT SPLITTER (2 TUNER) *CT–36G32V CT–36G32UV*
M003	ETC39C6NA	YOKE, CONVERGENCE
M004	EUR511050A	TRANSMITTER, REMOTE CONTROL *CT–36G32V CT–36G32UV*
M005	EUR511051A	TRANSMITTER, REMOTE CONTROL *CT–36G22V CT–36G22UV CT–36G22CV*
M006	UR51EC843A	BATTERY COVER, REMOTE
DEG	**0LK19049A**	**COIL, DEGAUSSING 35"**
DY	**KDY42L632F**	**YOKE, DEFLECTION**
M007	TAS2AA0004	SPEAKER 8–OHM 7W
M008	TBM2AA0021	BADGE, PANANSONIC
M009	TBX2AA1201G	BUTTON, 7–KEY
M010	**TJSC00300**	**CRT SOCKET**
M011	TMM2A30702	WEDGE, YOKE
M012	TMW2AF0031	REAR BRACKET *CT–36G32V CT–36G32UV*
M013	TMW2A97121	STRAIN RELIEF: AC LINE CORD
M014	TQB2AA0116	MANUAL, OWNERS *CT–36G32V CT–36G32UV*
M015	TQB2AA0118–1	MANUAL, OWNERS *CT–36G22V CT–36G22UV*
M016	TQB2AA0119–1	MANUAL, OWNERS *CT–36G22CV*
M017	TSP2AF001	COIL, GEOMAGNETIC
M018	**TSX2AA0011**	**LINE CORD**
M019	TXF3A025QA	ASSY, DAG GND
M020	TXFKU2097SER	ASSY, CABINET BACK 36"
M021	TXFKY2597SER	ASSY, CABINET FRONT 36"
M022	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP
JK3031	TJB18619	AV TERMINAL (2AV VAO)

SERVICEMAN MODE (ELECTRONIC CONTROL)
SERVICE ADJUSTMENT VALUES

Model _____ Ser # _____ Date _____

Note: Record the original settings PRIOR to modifying the registers.

Mode	Service Adjustment	Adjustment Range	Def. Val.	Original Value	New Value
Sub Adjustments					
B0	Sub Color	0 ~ 63	33		
B1	Sub Tint	0 ~ 63	33		
B2	Sub Brightness	0 ~ 255	80		
B3	Sub Contrast	0 ~ 63	34		
B4	Killer/ABL/Gamma	0 ~ 7	5		
B5	Video Adjustment	0 ~ 15	8		
B6	Audio Adjustment	0 ~ 31	16		
B7	V-Size	0 ~ 63	20		
White Balance Adjustments					
C0	RED Cutoff	*	0 128		
C1	GRN Cutoff	0 ~ 255	64		
C2	BLU Cutoff	*	0 128		
C3	R Drive	0 ~ 127	64		
C4	Blue Drive	0 ~ 127	64		
C5	YNR Switch	0 ~ 1	0		
C6	AFT	*	0 128		
C7	RF AGC	0 ~ 127	64		
C8	YNR	0 ~ 7	0		
C9	Horizontal-Center	0 ~ 31	16		
Ca	Beam Limit	0 ~ 7	0		
Cb	Y Delay	0 ~ 2	2		

* Adjustment indicated in steps:
0 0 ~ 0 255
1 0 ~ 1 255

Mode	Service Adjustment	Adjustment Range	Def. Val.	Original Value	New Value
Option Adjustments					
S0	PIP Color	0 ~ 127	65		
S1	PIP Contrast	0 ~ 127	52		
S2	Up 1/9	0 ~ 255	26		
S3	Down 1/9	0 ~ 255	146		
S4	Left 1/9	0 ~ 255	9		
S5	Right 1/9	0 ~ 255	103		
S6	Up 1/16	0 ~ 255	27		
S7	Down 1/16	0 ~ 255	163		
S8	Left 1/16	0 ~ 255	9		
S9	Right 1/16	0 ~ 255	118		
Sa	Freerun	**	**		
Sb	Clock Adjustment	0 ~ 255	128		
Sc	PIP Tint	0 ~ 63	50		
Sd	Loudness Compensation	0 ~ 63	52		
MTS Adjustments					
M0	Input Level	0 ~ 63	31		
M1	Stereo PLL/VCO	0 ~ 63	31		
M2	Filter	0 ~ 63	31		
M3	Low-level Separation	0 ~ 63	31		
M4	High-level Separation	0 ~ 63	31		

** Set Freerun on when this item is selected.

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